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NINTH ANNUAL REPORT

OF THE

Mass:

COMMISSIONERS

ON

INLAND FISHERIES,

and game

FOR THE

YEAR ENDING JANUARY 1, 1875.

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Commonwealth of Massachusetts.

To His Excellency the Governor and the Honorable Council.

The Commissioners on Inland Fisheries beg leave to present their Ninth Annual Report:—

The fishway at Holyoke, leading from the river into the canal above, was finished last fall.

Early in the spring, two of the Commissioners—one from Connecticut and one from this State—visited Turner's Falls, in order to note the effect of high-water at the time fish would be most likely to run, and also to make a general survey of the dam. On the third of August, the Commissioners of Vermont, New Hampshire, Connecticut and Massachusetts met at the Falls to decide upon the best location for a fishway. This was by no means an easy matter. It could not be taken into the canal, as was the case at Holyoke; and the bank on the north side of the river is so steep and rocky that a fishway built there would not only be very expensive, but liable to be carried away by a freshet. Fortunately, the dam is divided in the middle by an island extending several hundred feet down the stream, and, by blasting a channel thereon some eighteen feet wide and three hundred feet long, a very fair location could be made. Satisfied that this was not only the most feasible, but by far the least expensive plan that could be adopted, negotiations were at once opened with the Turner's Falls Company, which, we regret to say, were not met with the spirit that former communications had led us to expect. Delay after delay followed, and it was not until the matter

was placed in the hands of their treasurer that a satisfactory settlement was arrived at. The work is already under way, with the understanding that it shall be so far completed by the first of May as to allow the easy passage of salmon over the dam.

The plan of the Holyoke fishway was unanimously adopted by the Commissioners of the four States interested. No doubt was felt or expressed as to its capacity for salmon; for enough was known of the habits of these fish, both in this country and in Europe,—where salmon-ways have long been in use,—to settle the question.

But with the shad there had not been sufficient experience to render it equally certain; yet there was reason to believe that it would answer equally well for both species of fish. Your Commissioners did not understand nor expect that shad, or even salmon, would go over *any* fishway, if bred *below* and not *above* it. All migratory fish return to the place where they are hatched, provided there are no insurmountable obstacles in the way. This holds good whether there is or is not a dam across the stream or river. Even in an unobstructed river, migratory fish do not pass beyond their spawning-beds. In rivers where one or more branches are stocked with these fish, as is often the case, they pass up the main river until they reach the branch, and ascend that, leaving the open river behind. Without this migratory law, the stocking of particular rivers would be impossible. Throughout these reports we have endeavored to make this understood, for it is one of the most important axioms of fish-culture. When the shad came, last spring, to the foot of the Holyoke dam, where many of them still spawn, they passed directly over the mouth of the fishway, paying no attention to it. This was a great disappointment to many, who would not or could not see that the fish were bred below and had no motive to go above. In part to satisfy these good people, and partly to test some experiments we had in view, a screen was placed across the foot of the fishway, and eighty shad were dipped up and put into the lower part of it. These fish, finding themselves out of their accustomed locality, tried to force a passage through the screen. Finding their way barred in that direction, they turned their heads to the current, and all that were not hurt

in dipping up passed through the fishway—four hundred and forty feet long—with more ease than they had ascended the rapids in the river below. Fifty-two were known to have passed through the canal and into the river above. From these facts it will be seen that there is no *mechanical* difficulty in the way of shad passing over the fishway. When those that have been bred above return, seeking a place to deposit their spawn, which will be in two or three years, there is every reason to expect that they will pass freely over. Possibly some plan may be devised by which even this time can be abridged.

As far as possible, we have acted upon all matters brought before us. The continued high-water, during the spring and summer, made it difficult to construct fishways without putting mill-owners to unnecessary expense. The application from the town of Carver, to have the Weweeantit River opened up to Simpson's Pond, has been considered, and the fishways will probably be completed by the first of May. Plans have been drawn for fishways on the Westfield and Agawam Rivers, and negotiations are now pending with the Agawam Canal Co. for the construction of the same. Surveys have been made of the Shawshine; and the first instalment of young salmon was put into that river by the towns of Bedford and Billerica, last spring.

By a vote of the town of Lancaster, April 6, 1874, your Commissioners were called upon to open Nashua River. The New Hampshire Commissioners were notified of the call, but, a change having taken place in their commission and a new board appointed, the request was not acted upon. At the annual meeting of the New England Commissioners, to be held this winter, the attention of the present board will be called to the demands made by this State for a fishway on that river.

ALEWIFE (*Alosa Tyrannus*).

The information received of the increase of these fish, and the efforts that are being made to open and re-stock the rivers and streams along the coast, is very encouraging. We have in former reports pointed out the advantages of this culture, not only as a matter of profit, but as tending greatly to at-

tract the sea-fish in shore.* In the report of 1870 is an account of small fish found at Mystic Dam, supposed to be yearling alewives. Examination, in June, showed that the female was full of spawn. As alewives are not known to spawn until the fourth or fifth year of their existence, the study of these fish became a matter of some interest. Further observation renders it more than probable that they are not the *aloso tyrannus*, but a distinct species, seldom measuring over five inches in length, and weighing less than three ounces. They are not necessarily migratory, since they are found in the ponds connected with the Mystic River at all seasons of the year, and are often seen in shallow water, in large schools, in the spring, after the breaking up of the ice.

SHAD (*Alosa Præstabilis*).

The number of shad and spawn taken during the last season at North Andover, under the care of Mr. A. C. Hardy, was as follows :—

* See Appendix C.

| D A T E. | Shad taken. | Males. | Females. | Air at 6 P. M. | Water at 6 P. M. | Weather. | No. of Fish taken at each Sweep. | Spawns taken. | Time of Hauling Seine. |
|----------|-------------|--------|----------|----------------|------------------|--|--|---------------|---|
| June 12, | 24 | 16 | 8 | 58 | 64 | Rainy, . . | 4, 0, A.M.; 7, 9, 2, 2, P.M., | 150,000 | 4, 5, A.M.; 5, 6, 7, 8, P.M. |
| 13, | 28 | 23 | 5 | 60 | 64 | Rainy, . . . | 10, 9, 6, 3, P.M., . . | 50,000 | 7.30, 8.30, 10, 11, P.M. |
| 14, | 37 | 25 | 12 | 62 | 64 | Showers, . . | 14, 12, 7, 4, P.M., . . | 200,000 | 8, 9, 10, 11, P.M. |
| 15, | 34 | 23 | 11 | 60 | 66 | Clear, . . . | 15, 9, 7, 3, P.M., . . | 250,000 | 8, 9, 10.30, 11.30, P.M. |
| 16, | 46 | 35 | 11 | 66 | 66 | Rainy, . . . | 20, 12, 8, 6, P.M., . . | 300,000 | 7, 8, 9.30, 11, P.M. |
| 17, | 107 | 84 | 23 | 60 | 64 | Thunder show'r, { 16, 3, A.M.; 36, 19, 30, } 2, 1, P.M., . . . } | | 275,000 | { 10, 11.30, A.M.; 3.30, 4.30, 6, 8, 9, P.M. |
| 18, | 38 | 27 | 11 | 70 | 65 | Cloudy, . . . | 5, 9, 11, 7, 6, P.M., . . | 200,000 | 4, 5, 6.30, 8, 9, P.M. |
| 19, | 44 | 35 | 9 | 50 | 61 | Rainy, . . . | 8, 9, A.M.; 10, 4, 7, 5, P.M., | 50,000 | 4, 6, A.M.; 3, 5, 6, 8, P.M. |
| 20, | 108 | 81 | 27 | 55 | 58 | Dull, . . . | { 11, 13, 14, A.M.; 22, 24, } 11, 9, 7, P.M., . . . } | 25,000 | 5, 7, 8, A.M.; 3, 4, 5, 7, 9, P.M. |
| 21, | 60 | 33 | 27 | 52 | 61 | Clear, . . . | 16, 18, 12, 9, 5, P.M., . . | 40,000 | 3, 4, 5.30, 8, 9.30, P.M. |
| 22, | 171 | 111 | 60 | 71 | 72 | Clear, . . . | { 10, 10, 4, A.M.; 19, 26, 7, } 23, 16, 33, 23, P.M., . . } | 100,000 | { 5, 6, 7.30, A.M.; 1, 2, 3, 4, 6, 7, 8, P.M. |
| 23, | 134 | 87 | 47 | 66 | 68 | Clear, . . . | { 13, 7, A.M.; 15, 9, 10, 32, } 33, 15, P.M., . . . } | 400,000 | { 4.30, 5.30, A.M.; 2, 3, 5, 6, 7.30, 9, P.M. |
| 24, | 116 | 90 | 26 | 58 | 68 | Clear, . . . | { 16, 4, 16, A.M.; 9, 1, 10, } 6, 16, 25, 13, P.M., . . } | 250,000 | { 4, 5, 6.30, A.M.; 2, 3, 4, 5.30, 6.30, 7.30, 9, P.M. |

| D A T E. | Shad taken. | Males. | Females. | Air at 6 P. M. | Water at 6 P. M. | Weather. | No. of Fish taken at each Sweep. | Spawn taken. | Time of Hauling Seine. |
|----------|-------------|--------|----------|----------------|------------------|----------------|---|--------------|---|
| June 25, | 76 | 57 | 19 | 62 | 66 | Clear, . | { 0, A.M.; 19, 17, 16, 4, 13, } 7, P.M., | 175,000 | { 4.30, A.M.; 1, 2, 6, 7.30, 9, } 10, P.M. |
| 26, | 40 | 25 | 15 | 55 | 67 | Rainy, . | 9, 10, 11, 7, 3, P.M., . | 75,000 | 4, 5, 6.30, 8, 9.30, P.M. |
| 27, | 49 | 26 | 23 | 66 | 68 | Clear, . | 1, 3, 10, 16, 12, 7, P.M., . | 350,000 | 3, 4, 6, 7.30, 9, 10, P.M. |
| 28, | 58 | 31 | 27 | 70 | 69 | Clear, . | 26, 14, 10, 8, P.M., . | 275,000 | 7.30, 8.30, 10, 11, P.M. |
| 29, | 41 | 22 | 19 | 70 | 69 | Clear, . | 1, 16, 18, 6, P.M., . | 400,000 | 7, 8, 9, 10, P.M. |
| 30, | 39 | 19 | 20 | 72 | 70 | Clear, . | 6, 12, 14, 7, P.M., . | 275,000 | 7.30, 8.30, 9.30, 10, P.M. |
| July 1, | 41 | 25 | 16 | 65 | 72 | Clear, . | 20, 10, 7, 4, P.M., . | 225,000 | 7, 8.30, 10, 11, P.M. |
| 2, | 26 | 15 | 11 | 68 | 71 | Thunder storm, | 10, 9, 7, P.M., . | 125,000 | 7, 8.30, 9.30, P.M. |
| 3, | 31 | 18 | 13 | 69 | 71 | Cloudy, . | 11, 10, 6, 4, P.M., . | 200,000 | 7.30, 9, 10, 11, P.M. |
| 4, | 31 | 12 | 19 | 58 | 69 | Very wet, . | 17, 9, 5, P.M., . | 200,000 | 7.30, 9, 10, P.M. |
| 5, | 34 | 16 | 18 | 65 | 68 | Rainy, . | 13, 12, 7, 2, P.M., . | 300,000 | 6.30, 8, 9, 10, P.M. |
| 7, | 37 | 24 | 13 | 70 | 69 | Clear, . | 15, 12, 6, 4, P.M., . | 150,000 | 8, 9, 10, 11, P.M. |
| 8, | 43 | 27 | 16 | 71 | 70 | Clear, . | 14, 13, 9, 5, 2, P.M., . | 200,000 | 7.30, 9.10, 11, 11.30, P.M. |
| 9, | 25 | 12 | 13 | 71 | 70 | Clear, . | 11, 9, 3, 2, P.M., . | 300,000 | 8, 9, 10, 11, P.M. |

| | | | | | | | | | | | | | |
|----------|----|----|----|----|----|---------|---|---|--------------------|---|---|---------|-------------------------|
| July 10, | 17 | 10 | 7 | 71 | 74 | Cloudy, | . | . | 8, 6, 3, P.M., | . | . | 100,000 | 7.30, 9, 10, P.M. |
| 11, | 13 | 6 | 7 | 68 | 74 | Cloudy, | . | . | 6, 4, 3, P.M., | . | . | 125,000 | 7.30, 8.30, 9.30, P.M. |
| 12, | 29 | 9 | 20 | 58 | 68 | Rainy, | . | . | 11, 8, 6, 4, P.M., | . | . | 150,000 | 6.30, 7.30, 9, 10, P.M. |
| 13, | 10 | 6 | 4 | 64 | 60 | Clear, | . | . | 4, 3, 3, P.M., | . | . | 50,000 | 7, 8, 9, P.M. |
| 14, | 17 | 11 | 6 | 72 | 70 | Clear, | . | . | 4, 11, 2, P.M., | . | . | 25,000 | 8, 9, 10, P.M. |
| 15, | 24 | 8 | 16 | 75 | 70 | Clear, | . | . | 12, 8, 4, P.M., | . | . | 75,000 | 7.30, 8.30, 9.30, P.M. |
| 16, | 16 | 9 | 7 | 70 | 71 | Clear, | . | . | 6, 8, 2, P.M., | . | . | 100,000 | 7.30, 9, 10, P.M. |
| 17, | 12 | 7 | 5 | 70 | 72 | Clear, | . | . | 6, 4, 2, P.M., | . | . | 75,000 | 8, 9, 10, P.M. |
| 18, | 13 | 9 | 4 | 70 | 74 | Clear, | . | . | 4, 6, 3, P.M., | . | . | 30,000 | 8, 9.30, 10.30, P.M. |
| 19, | 12 | 8 | 4 | 68 | 72 | Clear, | . | . | 6, 4, 2, P.M., | . | . | 25,000 | 8, 9, 10, P.M. |
| 20, | 9 | - | 9 | 69 | 74 | Rainy, | . | . | 5, 4, P.M., | . | . | - | 8, 9, P.M. |

| | |
|---|-----------|
| Total number of shad caught, | 1,680 |
| of spawn taken, | 6,249,000 |
| Hatched and turned in above Lowell, | 1,950,000 |
| Young fish turned in above Lawrence Dam, | 800,000 |
| Delivered to George S. Esty, of Milton, for Neponset River, | 550,000 |
| Delivered to Simeon C. Keith, of East Bridgewater, for the Satucket River, | 200,000 |
| The balance were turned in at North Andover. | |

At the last session of the legislature, an Act was passed allowing fishing in the Merrimac with net and seine, three days of each week, from the first of March till the tenth of June. The number of shad reported was 16,077. From several of the seining grounds no report could be obtained; and as there was considerable violation of the law, it is probable that not less than 20,000 was the catch from this river last spring. We recommend the passage of a law requiring all persons using seines, nets, or traps of any kind, for the taking of fish in the waters under the jurisdiction of the Commonwealth, to report to the Commissioners on Inland Fisheries, on or before the first day of September of each year, the number and variety so taken, and the market value of the same. To such a law, we think, there would be no serious objection, as many of the fishermen have expressed themselves in favor of some regulation of this kind. The statistics thus obtained would be of great value to the State, as showing the magnitude of the fishing interests and the rapid increase that is everywhere following a more intelligent system of culture.

Hatching was continued at South Hadley, under the direction of Prof. Baird and the Connecticut Commissioners (Massachusetts furnishing the hatching-boxes), and the superintendence of Charles Smith.

The following is his report:—

Table of Shad-hatching Operations at South Hadley Falls, 1873.

| D A T E. | NUMBER OF SHAD TAKEN. | | | | | | | | Estimated num-ber of Ova. | THERMOMETER. | | | | | | FRY TURNED INTO THE RIVER. | | General Remarks. | |
|----------|-----------------------|-----|----------|-----|----------|-----|-----------|-----|---------------------------|--------------|--------|-----------|--------|--------|--------|----------------------------|--------|--|--|
| | 1st HAUL. | | 2d HAUL. | | 3d HAUL. | | 4th HAUL. | | | IN OPEN AIR. | | IN WATER. | | | | Lot. | Hour. | | |
| | Ma. | Fe. | Ma. | Fe. | Ma. | Fe. | Ma. | Fe. | | 6 A.M. | 1 P.M. | 6 P.M. | 6 A.M. | 1 P.M. | 6 P.M. | | | | |
| | | | | | | | | | | | | | | | | | | | |
| June 21, | - | - | - | - | - | - | - | - | R 500,000 | - | - | - | - | - | - | - | - | - | - |
| 23, | 1 | 72 | 3 | 31 | 22 | - | - | - | 600,000 | 69 | 70 | 68 | 71 | 71 | 71 | - | - | - | Net hung; no shad third haul. |
| 24, | 2 | 33 | 2 | 29 | 16 | 26 | 17 | - | 660,000 | 69 | 68 | 67 | 72 | 72 | 72 | - | - | - | Cloudy; wind S.E. |
| 25, | 3 | 39 | 6 | 26 | 17 | 19 | 13 | - | 840,000 | 69 | 72 | 72 | 72 | 72 | 72 | - | - | - | Clear and warm; wind N.W.; 6 p.m., South wind. |
| 26, | 4 | 12 | 1 | 14 | 20 | 8 | 12 | - | 900,000 | 68 | 86 | 82 | 72 | 73 | 73 | - | - | - | Clear; South wind. |
| 27, | 5 | 15 | 6 | 19 | 20 | 18 | 16 | 12 | 1,085,000 | 66 | 92 | 90 | 73 | 75 | 75 | - | - | - | Wind S.; 6 p.m., South wind. |
| 28, | 6 | 24 | 5 | 15 | 16 | 7 | 20 | - | 1,280,000 | 72 | 89 | 81 | 75 | 75 | 75 | - | - | - | Wind S.; light rain this morn- ing; N.W. wind. |
| 29, | - | - | - | - | - | - | - | - | * | 73 | 90 | 82 | 75 | 76 | 77 | R 1 | 8 a.m. | Strong S. wind; shower last night; S. wind. | |
| 30, | 7 | 1 | 11 | 13 | 27 | 5 | 18 | 7 | 2,204,000 | 81 | 81 | 76 | 76 | 78 | 77 | 1 | 9 p.m. | Wind South; light shower. | |
| July 1, | 8 | 7 | 12 | 6 | 20 | 5 | 11 | - | 1,120,000 | 73 | 76 | 76 | 77 | 76 | 76 | 2 | 5 a.m. | Wind South; rainy all day. | |
| 2, | 9 | 6 | 16 | 8 | 21 | 9 | 20 | - | 1,680,000 | 68 | 90 | 78 | 76 | 79 | 79 | 3 | 5 a.m. | Wind South. | |
| 3, | 10 | 20 | 31 | 10 | 32 | 15 | 28 | 6 | 2,956,000 | 78 | 90 | 80 | 78 | 81 | 79 | 4 | 6 a.m. | Wind S.; water shut out of canals at Holyoke; water 8 inches higher. | |

* Sunday.

Table of Shad-hatching Operations at South Hadley Falls, 1873 — Concluded.

| DATE. | NUMBER OF SHAD TAKEN. | | | | | | | | Estimated num-ber of Ova. | THERMOMETER. | | | | | | FRY TURNED INTO THE RIVER. | | General Remarks. | |
|---------|-----------------------|-----|----------|-----|----------|-----|-----------|-----|---------------------------|--------------|--------|--------|-----------|--------|--------|----------------------------|-------|------------------|--|
| | 1st HAUL. | | 2d HAUL. | | 3d HAUL. | | 4th HAUL. | | | IN OPEN AIR. | | | IN WATER. | | | Lot. | Hour. | | |
| | Ma. | Fe. | Ma. | Fe. | Ma. | Fe. | Ma. | Fe. | | 6 A.M. | 1 P.M. | 6 P.M. | 6 A.M. | 1 P.M. | 6 P.M. | | | | |
| | | | | | | | | | | | | | | | | | | | |
| July 4, | 11 | 18 | 24 | 12 | 41 | 7 | 18 | 5 | 16 | 2,440,000 | 74 | 94 | 86 | 78 | 80 | 81 | 5 | 7 p.m. | Wind South; wind N.W. |
| 5, | 12 | 13 | 30 | 15 | 31 | 8 | 13 | - | - | 2,030,000 | 74 | 82 | 67 | 79 | 81 | 79 | 6 | 9 p.m. | Wind South; wind South. |
| 6, | - | - | - | - | - | - | - | - | - | * | 67 | 72 | 76 | 79 | 80 | 78 | 7 | 10 p.m. | Wind N.W.; water risen 10 in. |
| 7, | 13 | 37 | 77 | 15 | 43 | 8 | 19 | - | - | 3,116,000 | 52 | 93 | 74 | 75 | 77 | 75 | 8 | 6 a.m. | Wind N.W. |
| 8, | 14 | 14 | 22 | 19 | 77 | 8 | 20 | - | - | 3,000,000 | 59 | 72 | 65 | 75 | 76 | 75 | 9 | 11 p.m. | Wind N.W., cloudy; 6 p.m. South wind. |
| 9, | 15 | 20 | 47 | 12 | 32 | 6 | 12 | - | - | 3,160,000 | 64 | 72 | 68 | 75 | 76 | 76 | 10 | 9 p.m. | Wind N.E.; 6 p.m., N.W. wind. |
| 10, | 16 | 19 | 29 | 8 | 31 | 7 | 19 | - | - | 1,740,000 | 77 | 82 | 73 | 76 | 77 | 76 | 11 | 6 a.m. | Wind South. |
| 11, | 17 | 4 | 21 | - | 25 | 7 | 18 | - | - | 1,050,000 | 64 | 79 | 70 | 75 | 75 | 74 | 12 | 9 p.m. | Wind; cloudy; no male; 2d haul; 6 p.m., N.W. wind. |
| 12, | 18 | 12 | 25 | 10 | 29 | 4 | 12 | - | - | 1,750,000 | 62 | 81 | 80 | 74 | 75 | 75 | - | - | Wind N.W.; 6 p.m., S. wind. |
| 13, | 19 | 11 | 51 | 8 | 7 | 4 | 11 | - | - | *1,810,000 | 66 | 80 | 75 | 75 | 76 | 75 | 13 | 10 p.m. | Wind S.; 6 p.m., S. wind. |
| 14, | 20 | 14 | 31 | 6 | 33 | 5 | 14 | - | - | 2,008,000 | 74 | 92 | 79 | 76 | 78 | 76 | 14 | 9 p.m. | Wind S.; 6 p.m., S. wind. |
| 15, | 21 | 9 | 19 | 6 | 31 | 3 | 10 | - | - | 1,120,000 | 91 | 90 | 80 | 76 | 78 | 76 | 15 | 5 a.m. | Wind N.W.; 6 p.m., S. wind. |
| 16, | 22 | 8 | 35 | 2 | 8 | 5 | 12 | - | 72 | 1,040,000 | - | 84 | 80 | 76 | 77 | 77 | 16 | 6 a.m. | Wind N.W.; 6 p.m., S. wind. |

| | | | | | | | | | | | | | | | | | | | |
|----------|----|----|----|---|----|---|----|---|---|-----------|----|----|----|----|----|----|---|---|---|
| July 17, | 23 | 7 | 30 | 1 | 14 | 2 | 10 | - | - | 1,312,000 | 72 | 80 | 62 | 76 | 76 | 75 | 17 | 9 p.m. | Wind N.W.; 6 p.m., S. wind. |
| 18, | 24 | 6 | 15 | 3 | 21 | 4 | 10 | - | - | 1,140,000 | 60 | 62 | 61 | 73 | 73 | 73 | 18 | 10 a.m. | Wind S.; 6 p.m., N.E. wind. |
| 19, | 25 | 8 | 17 | 2 | 14 | - | - | - | - | 210,000 | 58 | 69 | 62 | 68 | 69 | 69 | 19 | 8 p.m. | Wind N.E.; water rising; no spawners second haul. |
| 20, | - | - | - | - | - | - | - | - | - | * | 71 | 74 | 82 | 71 | 71 | 71 | 20 | 9 p.m. | Wind N.W.; water risen 3 ft.; 6 p.m., N. W. wind. |
| 21, | 26 | 23 | 51 | 6 | 31 | 4 | 21 | - | - | 2,040,000 | 63 | 81 | 79 | 70 | 71 | 71 | 21 | 6 a.m. | Wind N.W.; 6 p.m., N.W. wind. |
| 22, | 27 | 12 | 16 | 5 | 29 | 4 | 11 | - | - | 270,000 | 72 | 74 | 71 | 70 | 71 | 71 | 22 | 10 p.m. | Wind N.W.; 6 p.m., N.W. wind. |
| 23, | 28 | 14 | 22 | 6 | 27 | 5 | 13 | - | - | 840,000 | 80 | 88 | 79 | 71 | 72 | 72 | 23 | 8 p.m. | Wind N.W.; 6 p.m., S. wind. |
| 24, | 29 | 5 | 17 | 4 | 13 | 2 | 10 | - | - | 325,000 | 77 | 88 | 76 | 73 | 74 | 73 | 24 | 11 p.m. | Wind S.; 6 p.m., S. wind. |
| 25, | 30 | 6 | 10 | - | 14 | 6 | 9 | - | - | 50,000 | 73 | 80 | 79 | 73 | 78 | 75 | 25 | 9 p.m. | Wind S.; 6 p.m., S. wind. |
| 26, | 31 | 3 | 7 | 1 | 5 | 3 | 6 | - | - | 210,000 | 79 | 91 | 81 | 75 | 75 | 76 | - | - | Wind S.; 6 p.m., S. wind. |
| 27, | - | - | - | - | - | - | - | - | - | - | 73 | 83 | 73 | 76 | 78 | 77 | $\left\{ \begin{smallmatrix} 26 \\ 27 \end{smallmatrix} \right\}$ | $\left. \begin{matrix} 11 \text{ p.m.} \\ 28 \end{matrix} \right\}$ | Wind S., rain; 6 p.m., N.W. wind. |
| 28, | 32 | 2 | 11 | 3 | 10 | 2 | 7 | - | - | 70,000 | 74 | 85 | 83 | 76 | 78 | 78 | $\left\{ \begin{smallmatrix} 28 \\ 28 \end{smallmatrix} \right\}$ | 6 p.m. | Wind N.W.; 6 p.m., S. wind. |
| 29, | - | - | - | - | - | - | - | - | - | - | 73 | 82 | 76 | 78 | 78 | 78 | 29 | 10 a.m. | Wind S.; 6 p.m., S. wind. |
| 30, | - | - | - | - | - | - | - | - | - | - | 78 | 81 | 77 | 78 | 78 | 79 | 30 | 9 p.m. | Wind S., 6 p.m., S. wind. |
| 31, | - | - | - | - | - | - | - | - | - | - | 78 | 81 | 77 | 78 | 79 | 79 | 31 | 10 p.m. | Wind N.W.; 6 p.m., S. wind. |
| Aug. 1, | - | - | - | - | - | - | - | - | - | - | 68 | 88 | 78 | 82 | 82 | 81 | 31 | 8 p.m. | - |

* Sunday.

Total catch of shad, 3,016 ; spawn, 44,556,000. By comparing the two reports, it will be seen that the 608 females, taken at North Andover, yielded 6,249,000,—an average of 10,278 to each female ; while Mr. Smith reports 1,964 females, and 44,556,000 ova,—an average of 22,691 to each female. The establishment at North Andover is managed with great care by Mr. Hardy ; and we have reason to know, by personal observation, that his estimate of spawn is generally correct. It is easy to approximate, very closely, the number of spawn by measuring.

An agreement was made with the Connecticut Commissioners, that all young fish, not wanted by Prof. Baird, should be placed at the disposal of the Massachusetts Commissioners, to be taken above the Holyoke dam, and a man was employed for that purpose. But, for some reason unknown to us, Mr. Smith did not comply with the orders given him, and only about 2,300,000 were thus disposed of. A portion of these were put in at Bellows Falls, and the remainder between there and Smith's Ferry.

We are under obligations to Prof. Baird for assistance rendered in transporting these fish.

SMELTS (*Osmerus viridescens*).

Smelts have been very plenty this fall, and many persons, out of employment, have had abundant reason to feel thankful for the efforts made during the last four years to increase these fish.

As high as eighty dozen have been taken with a single rod in one day. To the Massachusetts Anglers' Association (composed of several hundred of some of the most influential men in the State) mainly belongs the credit of enforcing the law for their protection.

TROUT (*Salmo Fontinalis*).

The artificial hatching and rearing of trout continues with increasing interest. But many who are engaged in this pursuit have experienced much disappointment and vexation in consequence of a disease which attacks the young fry soon after they begin to feed, causing severe loss. We are satisfied that this trouble does not arise from artificial fecundation ;

for, if the eggs are perfectly ripe when taken from the female, there can be no difference between this method of impregnation and that produced in the ordinary way. We have hatched trout-spawn, impregnated in both ways, without being able to discover any difference either in health, vigor or growth of the young fish. The cause of this mortality is undoubtedly lack of proper food: for trout, to be healthy, should have, not only animal, but a certain amount of vegetable and mineral food. Young trout have generally been reared, for the first year at least, in tanks and runways. Of these two forms, the tank is the least desirable; runways are sometimes successful, but this success depends entirely upon the nature of the soil through which the trench is cut and whether the water supplying it contains a sufficient number of small insects to vary their food.

If those engaged in the cultivation of trout will abandon the tanks, and, in most cases, the runways, and substitute properly constructed ponds, they will have little cause to complain of loss from disease. The ponds should be in the shape of the letter V, or, what perhaps would be better, pear-shaped. At the apex, or small end where the water flows in, it should be three or four feet deep; from this point to the other end where the water flows out, the bottom should rise on an inclined plane, giving at that end a depth of about six inches. In the shallow portions of this pond (which will be about one-half of it) should be planted water-cresses and such weeds as generate the largest amount of insect life. In this pond the young trout should be placed as soon as the yolk-sac is absorbed, and fed, for the first two months at least, on rennet-curd, as described in a former report.

SALMON (*Salmo Salar*).

The proportion of salmon-spawn due this State, last year, from the Bucksport salmon-breeding establishment, was 180,000. To this was added 100,000, presented to the State by Prof. Baird, United States Commissioner, making in all 280,000. These were received in January, at the state hatching-house, in remarkably good condition, and hatched with a loss of less than four per cent., producing 271,000 healthy young fish. In accordance with an agreement made

with the States of New Hampshire, Vermont, and Connecticut, these were deposited in the Connecticut River and its tributaries. Fifty thousand were put into the Westfield River, and the balance taken by Dr. M. C. Edmunds, Commissioner of Vermont, to the tributaries above Bellows Falls.

About 800,000 were put in by the four States. This is probably the largest number of young salmon ever hatched and turned into any river in one year. The Bucksport establishment, originally started in the interests of Maine, Connecticut and Massachusetts, for the purpose of re-stocking their exhausted rivers, has become a complete success; and the States can now have, from this place, at a small expense, all the salmon-spawn that may be required. A note just received from Mr. Atkins informs us that he has this fall secured 2,900,000 spawn, and that there is more yet to be taken.

This can be repeated yearly, and the number increased if need be, and entirely removes the difficulty which so long retarded our efforts in that direction. The question of *re-stocking*, by artificially hatching salmon, and turning them into rivers where they have been destroyed, or *stocking* where none heretofore existed, is no longer an open one. The experiments of the last twenty-five years in Europe have made it as certain as the planting or sowing of any crop. The experiment of increasing salmon in rivers already stocked has also been successful. In 1852, the rental of the River Tay, in Scotland, had fallen to \$39,866.25. In 1853, a small establishment was started at Stormontfield, near the headwaters of the river, for breeding salmon. The fish were hatched and kept in small ponds until they were ready to go to sea. It is doubtful if the rearing of young salmon in this way is desirable. Probably a much larger percentage would have lived had they been turned into the river as soon as the yolk-sac was absorbed. In 1864, the rental reached \$85,000, an increase of \$45,133.75. This river, like all other salmon rivers, fluctuates, producing in some years much more than in others. The lowest yield, during the last eight years, has not fallen below \$27,000, and the rental, on an average, has more than doubled. The cost of procuring, yearly, the same number of salmon, for the Connecticut or Merrimac, annually

turned into the Tay, would not exceed \$1,000. Salmon are beginning to return in both these rivers. On the 27th of June, Mr. Hardy caught, at North Andover, while taking shad for spawn, a salmon weighing nineteen pounds. Several have been taken on the Connecticut, and quite a number were caught with hook and line in Massachusetts Bay during the summer. Also one weighing twenty pounds was reported found dead on lower Mystic Pond.

In the Appendix will be found a report from the United States Commissioner on the distribution of young shad and salmon, giving some idea of the work done up to 1872. This statement does not include the hatching and distributing of other species of fish, or the great amount of labor of a local character not necessarily claiming the attention of the department at Washington. The hatching and distribution of young salmon and shad in the several States, for 1873 and 1874, was several times greater than the whole number given in that report.

LAND-LOCKED SALMON.

Six thousand spawn of these salmon were received from Sebec, in February, producing about 5,500 young fish, which were distributed as follows: to G. Parlon, for Long Pond, head of Namasket River; O. Whitney, for pond leased by town of Ashburnham; Mr. Heywood, for pond leased by town of Gardner; Mr. Murray, for pond leased by Pittsfield; towns of Bedford and Billerica, for Shawshine River; and Winchester and Medford, for Mystic Pond.

It is designed, as heretofore stated, to furnish towns having suitable waters with these fish,—they either paying for transportation, or sending a competent person to the state hatching-house for them. All applications should give a careful description of the ponds, streams or rivers intended to be stocked, that the Commissioners may judge whether they are suitable.

SACRAMENTO SALMON (*Salmo Quinnat*).

Two hundred thousand spawn of this species were received, presented to the State by Prof. Baird. Unfortunately, they were so injured by transportation that only about seven thousand were hatched.

GREAT PONDS.

A very healthy state of feeling is rapidly growing up in regard to the cultivation of fish in the great ponds, and constant applications are made for leases, both by private parties and by the inhabitants of the towns where such ponds are located. The jealousy which heretofore more or less excited the public mind, in reference to the control of such waters by individuals, is fast dying out, and a more enlightened view taking its place. Few, if any, attempts are made to interfere with the rights of lessees, and a general disposition is shown to encourage all efforts to restock the ponds.

A few of the great ponds should be under the *direct* control of the Commissioners, for the purpose of more carefully studying the best methods of culture, and also to serve as a nucleus for raising and distributing fish throughout the State. That our great ponds are to become the source of considerable wealth is shown, not only by what a few of them have already produced, but also from the statistics of other countries, where a more general system of culture has been successfully carried out.

In France, 493,750 acres of lakes and ponds yield an annual rental of \$2,000,000. This is so much clear gain,—so much additional food for the people; for, after lakes and ponds are well stocked, with proper care and regulation they become self-sustaining, requiring little or no labor to keep them up. Of course, it would be folly to suppose that any pond, no matter how thoroughly stocked, would stand the indiscriminate slaughter which some persons, regardless of the spawning season, consider themselves privileged to indulge in. The public right to the fisheries is under the control of the legislature, which has an undoubted right to regulate them. But something besides law is necessary if we hope to develop the wealth which our waters may be made to produce. The State of Massachusetts has 196,342 acres of lakes and ponds, and it may be well to consider their present value. With the exception of one or two ponds on the Cape and a few that have been leased, under the care of intelligent and thoughtful men, scarcely one of them would yield a fair meal for a good-sized family, once a

week. The same number of acres of water in France produces over \$800,000 a year. And yet, fish-culture in that country admits of much improvement; it has by no means reached its highest point. If we compare the two countries, the natural advantages will be found to be largely in our favor. We are not subject to the severe drouths that nearly dry up their rivers and often deplete them; nor is there anything in their water, or in the food it contains, leading to the production of a larger crop. The difference is not, then, in the climate nor in the water, but in the fostering care of the government and the practical knowledge of those who manage their fisheries.

Here everything depends upon the intelligence of the people; and, if we expect success, there should be an earnest coöperation, and, to some extent, the subordination of self to the public good.

So long as it is desirable to encourage the mechanical arts, or to render aid to agricultural improvements, so long will this question press itself upon our consideration; and a wise economy demands that it receive its full share of attention.

In conclusion, it is gratifying to be able to state, that at no time has there been so much interest shown in fish-culture as during the last year.

For the continuation of hatching and distributing young fish, and the necessary expenditures of the Commission, we recommend an appropriation of five thousand dollars.

THEODORE LYMAN,

E. A. BRACKETT,

ASA FRENCH,

Commissioners on Inland Fisheries.

EXPENDITURES OF COMMISSION.

| | |
|--|------------------|
| Salary, | \$1,549 99 |
| Travelling expenses, | 305 78 |
| Salmon and land-locked salmon enterprise, | 1,000 00 |
| Packing and transporting spawn and fish, | 152 28 |
| Taking shad-spawn, transporting young shad, and re- pairing hatching-boxes, | 618 55 |
| Pails and cans for transporting fish, | 31 25 |
| Postage, expressage and telegrams, | 23 15 |
| Printing, | 20 17 |
| Plans of fishways, | 63 00 |
| Rent of land for state hatching-house, | 50 00 |
| Breakwater at South Hadley Falls, | 300 00 |
| Labor at state hatching-house, | 9 00 |
| Total, | <hr/> \$4,118 17 |

DECEMBER 1, 1874.

APPENDIX.

[A.]

COMMISSIONERS ON FISHERIES.

UNITED STATES.

| | | |
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| PROF. SPENCER F. BAIRD, | | { Smithsonian Institute, Washington, D. C. |
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MAINE.

| | | |
|-------------------|-----------|-----------|
| E. M. STILWELL, | | Bangor. |
| HENRY O. STANLEY, | | Dixfield. |

NEW HAMPSHIRE.

| | | |
|------------------|-----------|-----------|
| OLIVER H. NOYES, | | Henniker. |
| JOHN S WADLEIGH, | | Laconia. |
| A. C. FIFIELD, | | Enfield. |

VERMONT.

| | | |
|----------------|-----------|----------|
| M. C. EDMUNDS, | | Weston. |
| M. GOLDSMITH, | | Rutland. |

MASSACHUSETTS.

| | | |
|-----------------|-----------|------------------|
| THEODORE LYMAN, | | Brookline. |
| E. A. BRACKETT, | | Winchester. |
| ASA FRENCH, | | South Braintree. |

CONNECTICUT.

| | | |
|--------------------|-----------|-------------|
| WILLIAM M. HUDSON, | | Hartford. |
| ROBERT G. PIKE, | | Middletown. |
| JAMES A. BILL, | | Lyme. |

RHODE ISLAND.

| | | |
|----------------------|-----------|-------------|
| NEWTON DEXTER, | | Providence. |
| ALFRED A. REED, Jr., | | Providence. |
| JOHN H. BARDEN, | | Scituate. |

NEW YORK.

| | | |
|----------------------|-----------|----------------|
| HORATIO SEYMOUR, | | Utica. |
| ROBERT R. ROOSEVELT, | | New York City. |
| EDWARD M. SMITH, | | Rochester. |

NEW JERSEY.

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| J. R. SHOTWELL, | Rahway. |
| G. A. ANDERSON, | Trenton. |

PENNSYLVANIA.

| | |
|-------------------------|----------------|
| H. J. REEDER, | Easton. |
| B. L. HEWITT, | Hollidaysburg. |
| JAMES DUFFY, | Marietta. |

MARYLAND.

| | |
|---------------------------|------------|
| T. B. FERGUSON, | Baltimore. |
| P. W. DOWNES, | Denton. |

VIRGINIA.

| | |
|----------------------------|--------------|
| WILLIAM B. BALL, | Mid Lothian. |
| ASA WALL, | Winchester. |

ALABAMA.

| | |
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| CHARLES S. G. DOSTER, | Montgomery. |
| RO. TYLER, | Montgomery. |
| D. R. HUNDLEY, | Courtland. |

OHIO.

| | |
|-----------------------------------|------------|
| JOHN HUSSEY, | Lockland. |
| JOHN H. KLIPPART, | Columbus. |
| DR. ELISHA T. STIRLING, | Cleveland. |

MICHIGAN.

| | |
|------------------------------|----------|
| J. J. BAGLEY, | Detroit. |
| ANDREW J. KELLOGG, | Allegan. |
| GEO. CLARK, | Ecorse. |

IOWA.

| | |
|------------------------------|-----------|
| SAMUEL B. EVANS, | Ottumwa. |
| B. F. SHAW, | Anamosa. |
| CHARLES A. HAYNES, | Waterloo. |

MINNESOTA.

| | |
|--------------------------|------------|
| A. W. LATHAM, | Excelsior. |
| DAVID DAY, | St. Paul. |
| HORACE AUSTIN, | St. Paul. |

CALIFORNIA.

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| B. B. REDDING, | Sacramento. |
| S. R. THROCKMORTON, | San Francisco. |
| J. D. FARWELL, | San Francisco. |

DOMINION OF CANADA.

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|---------------------------|---------|
| W. F. WHITCHER, | Ottawa. |
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[B.]

*List of Ponds leased by the Commissioners on Inland Fisheries, under authority given by Chap. 384, Sect. 9, of the Acts of 1869.**

- 1870.—Feb. 1. Waushakum Pond, in Framingham, to Sturtevant and others, 20 years.
Mar. 1. Tisbury Great Pond, in Tisbury and Chilmark, Allen Look and others, 10 years.
Apr. 1. Chauncey Pond, in Westboro', to Trustees Reform School, 5 years.
1. Mendon Pond, in Mendon, to Leonard T. Wilson and another, 20 years.
June 20. Silver Lake, in Wilmington, to Charles O. Billings and others, 20 years.
Sept. 12. Baptist Lake, in Newton, leased to J. F. C. Hyde and others, 20 years.
Oct. 15. Archer's Pond, in Wrentham, to William E. George, 15 years.
- 1871.—Jan. 10. Nine Mile Pond, in Wilbraham, to B. F. Bowles, 10 years.
30. Little Pond, in Falmouth, to F. H. Dimmick, 10 years.
Apr. —. Spectacle, Triangle and Peter's Ponds, in Sandwich, to G. L. Fessenden and another, 5 years.
17. Long Pond, in Falmouth, to Joshua S. Bowerman and three others, 20 years.
May 15. Pratt's Pond, in Upton, to D. W. Batcheller, 20 years.
18. Little Sandy Pond, in Plymouth, to William E. Perkins, 15 years.

* We would remind lessees of ponds that they are required, by their leases, to use all reasonable efforts to stock their ponds and keep accurate records of the same, and make returns of their doings to the Commissioners on the *first of October*, each year, of the number and species of fish which they have put in or removed from their ponds. Any failure to comply with these conditions is a breach of contract invalidating their lease. It is important that the State should know just what is being done; and, where there appears to be mismanagement, or apparent failures, the Commissioners will visit the ponds and ascertain, if possible, the cause.

- 1871.—Nov. 1. Punkapoag Pond, in Randolph and Canton, to Henry L. Pierce, 20 years.
- 1872.—Jan. 1. Sandy Pond, Forest Lake, or Flint's Pond, in Lincoln, to James L. Chapin and others, 20 years.
- Apr. 1. Onota Lake, in Pittsfield, to William H. Murray and others, 5 years.
- July 20. Little Pond, in Braintree, to Eben Denton and others, 20 years.
- 1873.—May 1. Meeting-house Pond, in Westminster, to Inhabitants of Westminster, 15 years.
1. Great Pond, in Weymouth, to James L. Bates and others, 15 years.
- July 1. Little Sandy Pond, in Pembroke, to A. C. Brigham and others, 16 years.
- Sept. 1. Pontoosuc Lake, in Pittsfield and Lanesboro', to E. H. Kellogg and others, 15 years.
- Oct. 1. Farm Pond, in Sherburne, to Inhabitants of Sherborn, 15 years.
1. Spot Pond, in Stoneham, to Inhabitants of Stoneham, 15 years.
- Nov. 1. Big Pond, in Webster, to Inhabitants of Webster, 5 years.
- Dec. 1. Lake Wauban, in Needham, to Hollis Hunnewell, 20 years.
- 1874.—Mar. 1. Walden and White Ponds, in Concord, to Inhabitants of Concord, 15 years.
2. Upper Nankeag, in Ashburnham, to Inhabitants of Ashburnham, 20 years.
- Apr. 1. Elder's Pond, in Lakeville, to Inhabitants of Lakeville, 15 years.
20. North and South Podunk Ponds, in Brookfield, to Inhabitants of Brookfield, 15 years.
- May 2. Brown's Pond, in Peabody, to John L. Shorey, 15 years.
2. Maquan Pond, in Hanover, to the Inhabitants of Hanover, 15 years,
16. Wickaboag Pond, in West Brookfield, to Lemuel Fullam, 15 years.
20. Unchechewalon and Massapog Ponds, to the Inhabitants of Lunenburg, 20 years.
- July 1. Hardy's Pond, in Waltham, to H. E. Priest and others, 15 years.

- 1874.—July 1. Hockomocko Pond, in Westboro', L. N. Fairbanks and others, 15 years.
11. Mitchell's Pond, in Boxford, R. M. Cross and others, 15 years.
Oct. 1. East Washacum Pond, in Sterling, to Inhabitants of Sterling, 20 years.
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To the Commissioners on Inland Fisheries.

GENTLEMEN :—In accordance with your request of the 16th inst., I furnish the accompanying particulars concerning the fish in Wau-shakum Pond. As the habits of the bass, both as studied in our pond and elsewhere, show them to be a very uncertain fish to the angler, on account of what at present, from limited information, seems but a caprice, I again, this year, confine myself to a transcript of disconnected notes, which are reliable. At some future day, I hope that the history of the life of this interesting fish may be completely known.

1874. May 14, saw the first bass of the season,—a little fellow about $3\frac{1}{2}$ inches long.

May 15. A fish nine inches long seen about boat-house, and the first catch; a male fish (?) weighing about three-quarters pound. No appearance of spawn or milt to be obtained by pressure.

May 22. Black bass spawning in G. B. Brown's pond,—a shallow sheet of water supplied by springs. The nests are on the shelving bank, in about eight inches deep of water, the gravel being cleanly swept. The 3-pound female and a $\frac{3}{4}$ -pound male fish, keeping side by side, sweep from the adjoining deep water in circles, which include the prepared nest. When the fish arrive over the bed, they both incline their sides until their bellies are in contact, and the milt and spawn, apparently emitted at the same time, come into contact, and, mixed with each other, seek the bottom. As they pass from the gravel into deep water, they resume their proper position on their circular course, which, again, in a short time, brings them to the former spot, where the same performance is repeated.

June 4. Although I have been unable to find any spawning-beds, and have seen but one or two black bass this year, yet this morning the pond about the boat-house and in places along the shore, both on the north and south sides, is filled with small fish, with the yolk-bag, or a central prominence which I take for such, unabsorbed. These little fellows are about three-eighths inch long,

have black eyes and a spot or a bar on the tail. I think they are black-bass fry.

June 6. Seven small black bass, from four to five inches long, about boat-house.

Aug. 20. Plenty of young bass all along shore; length all the way from two to four inches. From a constant watch of these small fish, continued during the summer, I am confident that these fish of different sizes are all from this year's spawn.

Oct. 1. Fish scarce about boat-house. Where formerly a dozen or so youngsters could be seen, now with difficulty can I find one or two.

Nov. 1. For the last week or ten days, not a youngster in sight. Gone to deep water?

The catch of 1874, as reported to me, has been as follows:—

- Feb. 14. Two fish; $1\frac{1}{2}$ pounds, 2 pounds (through ice).
 Apr. 11. Two fish; $1\frac{1}{2}$ pounds, $2\frac{3}{4}$ pounds.
 May 15. One fish; $\frac{3}{4}$ pound.
 Jun. 8. One fish; 1 pound.
 10. One fish; 1 pound.
 14. One fish; $\frac{3}{4}$ pound.
 19. One fish; 2 pounds.
 July 1. Two fish; 2 pounds, $2\frac{1}{2}$ pounds.
 20. One fish; $1\frac{1}{2}$ pounds.
 21. One fish; $3\frac{1}{2}$ pounds.
 25. Three fish; 1 pound, $1\frac{1}{8}$ pounds, $1\frac{1}{4}$ pounds.
 27. Two fish; $\frac{1}{2}$ pound, 2 pounds.
 30. Two fish; 1 pound, 1 pound.
 31. Six fish; $\frac{3}{4}$ pound, 1 pound, 1 pound, $1\frac{1}{2}$ pounds, 2 pounds, $2\frac{1}{2}$ pounds.
 Aug. 1. Two fish; 1 pound, 2 pounds.
 14. One fish; 1 pound.
 17. One fish; $\frac{3}{4}$ pound.
 18. Four fish; $\frac{3}{4}$ pound, 1 pound, 1 pound, 2 pounds.
 19. Three fish; 1 pound, 2 pounds, $2\frac{1}{4}$ pounds.
 21. Four fish; 1 pound, $2\frac{1}{4}$ pounds, $2\frac{1}{4}$ pounds, $2\frac{1}{2}$ pounds.
 22. One fish; $1\frac{1}{2}$ pounds.
 26. One fish; $1\frac{1}{4}$ pounds.
 Sept. 5. One fish; $1\frac{3}{4}$ pounds.
 8. Three fish; 2 pounds; $2\frac{3}{4}$ pounds; 3 pounds.
 12. One fish; $2\frac{1}{2}$ pounds.
 13. Three fish; $\frac{3}{4}$ pound, $1\frac{1}{4}$ pounds, $2\frac{1}{4}$ pounds.
 Oct. 9. One fish; 3 pounds.

The summary is as follows:—

| | | | |
|---------------------|---------|----------------------|----------|
| February, | 2 fish. | July, | 17 fish. |
| April, | 2 “ | August, | 17 “ |
| May, | 1 “ | September, | 8 “ |
| June, | 4 “ | October, | 1 “ |

| | | | |
|-------------------|------------------------|-------------------|------------------|
| 1 fish, | $\frac{1}{2}$ pound. | 9 fish, | 2 pounds. |
| 6 “ | $\frac{3}{4}$ “ | 4 “ | $2\frac{1}{4}$ “ |
| 13 “ | 1 “ | 4 “ | $2\frac{1}{2}$ “ |
| 1 “ | $1\frac{1}{8}$ pounds. | 2 “ | $2\frac{3}{4}$ “ |
| 3 “ | $1\frac{1}{4}$ “ | 2 “ | 3 “ |
| 5 “ | $1\frac{1}{2}$ “ | 1 “ | $3\frac{1}{2}$ “ |
| 1 “ | $1\frac{3}{4}$ “ | | |

| | |
|---|------------------------|
| In 1870, largest fish placed in pond, | 1 pound. |
| 1872, largest fish caught, | $2\frac{1}{2}$ pounds. |
| 1873, “ “ “ | 3 “ |
| 1874, “ “ “ | $3\frac{1}{2}$ “ |

These fish seem to prefer different bait at various seasons of the year. Judging from a limited experience, live bait is always the stand-by; angle-worms excellent in the early season; grasshoppers very telling for a week or two. At some seasons, water from five to six feet deep furnishes the best fishing ground; at other times, water of considerable depth.

Very respectfully yours,

E. LEWIS STURTEVANT.

WEST TISBURY, Nov. 20, 1874.

Commissioners on Inland Fisheries.

GENTLEMEN:—We have not put any new kinds of fish in the pond since my last report. We have removed from the pond twelve barrels of white perch, some two hundred barrels of herrings, and about ten barrels of smelts.

| | |
|-------------------------|----------|
| Net proceeds, | \$485 20 |
| Town's part, | 24 26 |

You will perceive that the catch was smaller than last year, not owing, however, to the scarcity of fish. We selected out some twelve barrels of the largest perch, and let them go as breeders. Also released all the smallest sized fish, which were very numerous. Herrings were very numerous, but, in consequence of the dullness of the market, we caught but a very small proportion of what were

in the pond. I should say that there were, certainly, six hundred barrels of herring left to spawn. They were about one-sixth larger than they were a few years ago. Smelts were not very plenty, and we fished but a very little for them. I noticed that there was an abundance of smelt-spawn attached to the pebbles and grass in the streams where they deposited their eggs during the month of April. I saw, also, a large number of smelts passing from the pond to the sea, about the middle of April. I caught some of them, and found that they had spawned. As far as I have noticed, it is very easy to raise fish; you not only want to let the small fish go, but a good many of the largest, and by so doing, and keeping the pond in good condition, you are sure of success.

Very truly yours,

ALLEN LOOK, *for the Lessees.*

NEWTON HIGHLANDS, NOV. 28, 1874.

To the Commissioners on Inland Fisheries.

GENTLEMEN:—It is now four years since Wiswall's or Baptist Pond, in Newton Centre, was stocked with black bass. Following your advice, we have not caught many fish yet, preferring to let the pond become well stocked before even the members of our small club of twelve allow themselves to fish *ad libitum*. The club voted that each member be allowed to catch three fish this year, which would make thirty-six in all, but only eleven have, so far as we know, been taken. These eleven weighed twenty-three and a quarter, or over two pounds each on an average. Some more were caught, and put back, because they were small. We were told that the average growth of these fish was a quarter of a pound a year. We are now satisfied that this is substantially correct. We have caught them weighing a pound, which must have been of the first year's hatching, for we put in none that weighed much less than that when put in four years ago. We caught others that weighed three-fourths of a pound, and still others that weighed half a pound, all of which we put back into the pond after they had been weighed. These fish we suppose to be of successive years' spawning. We have put no feed into the pond, which has the peculiarity of having no stream running into it. There were many small fish in it when we put in the bass, upon which they have doubtless fed. We propose to go on in the way we have begun, and by and by it will come to bass eating bass, as all the small fish of other sorts will have been eaten. Many fish

were seen during the spring and summer, and we believe the experiment is a complete success. We have caused the large pickerel, so far as possible, to be destroyed, by spearing, in the spring. It is not an easy thing to clean out the pickerel. We have had but one case of poaching since we leased the pond. Though we were told that the bass would not bite at live bait in winter, we are fully satisfied that they will. The experiment was tried with us, and several fish were caught, but were put back. The bass is a fine game-fish, and of good quality for the table. So far we have enjoyed the sport of catching them very much, and we look forward with pleasant anticipations to the future. We did not lease this pond to make money by the operation; and we expect, when it is well stocked, to give permits to our friends to fish. If the experiment should prove as successful as some predict, there is no reason why many may not enjoy the sport of fishing in this pond. We hope to obtain some small fry of land-locked salmon, and try the experiment of growing them in the same pond. We advise all who can control ponds, lakes, or streams, to stock the same with some useful fish, and thus add not only to their own enjoyment, but actually add to the wealth of the country.

With best wishes for the success of your efforts,

I remain, yours truly,

JAMES F. C. HYDE.

LINCOLN, MASS., Nov. 17, 1874.

To the Commissioners on Inland Fisheries.

GENTLEMEN:—Your notice to the lessees of Sandy Pond, dated November 16, is received, and I hereby acknowledge our neglect to make the return, pleading, as my only excuse, so much other business, that I had forgotten it, until yesterday, when I saw the face of Mr. Commissioner Brackett, on the streets of Boston.

The lessees of Sandy Pond, in the month of May, 1872, placed in said pond fifty-two black bass, the average weight of which was two pounds. Two of them were the largest known to have been moved alive, weighing not less than fourteen pounds. Our expenses have been for—

[illegible]

No fish have been taken by the lessees, nor permission given to any person to take any from the pond. A plenty of young fish, presumed to be the black bass, have been observed both in the pond and in the brook running out of it. In the summer of 1872 and 1873, very many bream, a worthless fish, were seen floating on the shores of the pond, mutilated in such a manner as to warrant the conclusion that they were destroyed by the bass. Pickerel, which were taken in moderate quantities before stocking the pond with bass, have been more scarce since, leading us to suppose the two are not congenial inhabitants of the same waters. I omitted to state what you may readily infer, that our income has been nothing.

Respectfully yours,

JAMES L. CHAPIN,
For Lessees of Sandy Pond.

STONEHAM, MASS., NOV. 20, 1874.

Commissioners on Inland Fisheries.

GENTLEMEN :—During the summer just passed, we have, in accordance with our lease, stocked Spot Pond with one hundred black bass, weighing not less than one and a half pounds each. The largest bass put in the pond weighed about five pounds. The fish were put in the pond as soon as Mr. Holmes could secure them, but not until after the spawning season, and we have seen but little of them since. We have taken no fish from the pond, nor given permission for any to be taken, since the granting of the lease to the Commissioners. Our townspeople are very generally satisfied with the lease and the investment of their money. Some dissatisfaction is manifested by one of our citizens living on the border of the pond, but we believe that he will soon see that it is for his interest, as well as others, that the pond should be stocked.

AMOS HILL,
Chairman of Selectmen of Stoneham.

SOUTH ABINGTON, Oct. 1, 1874.

To the Commissioners on Inland Fisheries.

DEAR SIRS :—In compliance with the the terms of our lease, we herein submit the following report :—

We leased Little Sandy Pond, in Pembroke, containing forty-nine acres, from your board, July 1, 1873, for sixteen years, for the

purpose of cultivating black bass. There were in the pond at that time, pickerel, yellow perch, shiners, roaches and minnows. We contracted with Mr. Robert R. Holmes, of East Wareham, to stock the pond by putting in fifty black bass, not to weigh less than two pounds each.

September 16, 1873, Mr. Holmes delivered and liberated in the pond, fifteen black bass, one weighing six ponds.

October 4, 1873, received and put in the pond, twenty-two bass, all fine fish, and in good condition.

October 23, 1873, Mr. Holmes delivered to us, and placed in the pond, fifteen black bass, weighing forty pounds.

This makes fifty-two black bass which we have put into the pond, all in good condition; and, considering the size of the fish, we think the pond is well stocked, for breeding purposes. And here we would like to say, in justice to Mr. Holmes, that he filled his part of the contract to our entire satisfaction, even putting in many larger fish than the contract required of him, and also that he proved himself an expert in the transportation of live fish by losing but one fish out of fifty-three large bass which he delivered to us. Just how well they have done this year, we are not able to say. We have seen numerous swarms of small fry in the shallows, but not being acquainted with bass fry, could not distinguish them from the fry of native fish; but in August we netted some small fish three inches long, which we knew to be black bass, and which we had seen at different times along the shores.

Hoping to give you next year a good and satisfactory report, which we feel confident we shall be able to do, I am,

Truly yours,

A. C. BRIGHAM.

PITTSFIELD, NOV. 19, 1874.

To the Commissioners on Inland Fisheries.

Your circular of inquiry, in regard to the stocking of Onota Lake with useful fish, was duly received, and herewith I present you with the facts as regards what fish we have put into the lake; there has not been sufficient time to report as to the success of our efforts, only we know that several species are evidently proving successful. We had put in several kinds of fish before leasing; since leasing, we have put in 40,000 lake-trout, 400 land-locked salmon and a few black bass. We have issued notices governing the modes of catching and the time of catching, which are in accordance with the general state law, and prohibit all winter-fishing. The law is very

generally observed in this vicinity. As regards the public feeling here in regard to fish-culture, they seem to take a very favorable opinion of the matter. I am unable to give any suggestions in regard to the culture which would be of any service to the Commissioners or State, having had no experience in the business.

Very truly yours,

WM. H. MURRAY,
For the Lessees of Onota Lake, Pittsfield.

SANDWICH, Nov. 18, 1874.

To the Commissioners on Inland Fisheries.

Your circular of the 16th received. I have little to add to my returns of last year,—nothing further than that I am fully assured; from my own observation and the evidence of others, that the black bass are increasing rapidly in the three ponds. I fished Spectacle Pond for a few hours, in October; caught several bass; three of them fish bred in the pond; all were returned to the pond. I do not doubt but that the ponds will be well stocked at the expiration of the lease. I think that we have ponds adapted to the land-locked salmon. Should like much to procure two or three hundred young fish for trial. Don't care to bear all the expense, as it will benefit the public. Could you not help me officially?

Yours truly,

GEO. L. FESSENDEN.

ASHBURNHAM, December 3, 1874.

To the Commissioners on Inland Fisheries.

SIRS:—Pursuant to the authority granted by the legislature of 1873, this town, at their last annual March meeting, voted to take a lease of Naukeag Lake, or Meeting-house Pond, situated within its limits; and, as their agent, duly appointed, a lease for twenty years was received by me from your board.

The lake is a beautiful sheet of water, has considerable local repute, contains some five hundred acres, and varies in depth from twenty to fifty feet. Its situation is such that it is almost surrounded by hills, having but one outlet, and this into the Connecticut River, by way of Miller's River. It is fed by mountain-streams and from

a number of springs which well up from its bed. A portion of the shore is a white sand, sloping gently to the centre, while a larger part is bold and rocky. It will be seen that here are requisites, in its cool spring-water, deep coverts and spawning-grounds, for a successful cultivation of some of the best varieties of fresh-water fish. The present kinds of fish which have been caught and are known to live in its waters are pouts, pickerel, perch, shiners and bream.

It was decided to attempt to stock the lake with land-locked salmon and black bass; and I obtained from Mr. Commissioner Brackett some four hundred and fifty land-locked salmon fry, which were transferred in fine order, with a loss of only four. On the 15th of May last, I received from Mr. Livingston Stone forty-six Lake Champlain bass, and, on the 23d day of the same month, fifty-four more, which were immediately put into the lake in capital condition. They were fine and lusty specimens of this variety of fish, and weighed from two to five pounds each, the females being very heavy with spawn. It is, of course, now too short a time in which to present any data as to the success of the enterprise. Occasionally during the year I have visited the lake for the purpose of watching any movements which they might make. During the spawning-season I was rewarded by finding them upon their nests; and later saw them frequently in pairs, swimming about in shallow feeding-ground.

The interest attendant upon fish-culture, when once awakened, and the considerable success I have met with in breeding trout in my own private ponds,—in which I have some ten thousand fish, varying in size from the yearling to the speckled beauty weighing some four pounds, the greater number of which I have hatched and raised myself, and from which I am now taking some seventy-five thousand spawn,—lead me to assure your board of the success of this enterprise.

And, looking to the promotion of the interest in fish-culture, I shall always be glad to meet and show to the members of your board, or any person who may apply to you for information, my private ponds and some original appliances, which have proved themselves of much value in their management.

I am, with great respect, your obedient servant,

OHIO WHITNEY, *Agent.*

[C .]

BOSTON, Dec. 12, 1874.

To the Commissioners on Inland Fisheries.

GENTLEMEN :—In reply to your inquiries as regards the practical working of the smelt-law, passed by our last legislature, and the effect of the close time, allow me to say that it has exceeded the most sanguine expectations of the friends of this beautiful fish. Smelt of enormous size have been caught, whilst thousands of small smelt have shown the beneficial result of allowing the females to throw their spawn last spring, instead of being stolen by a few seines. Besides this, hundreds and tens of hundreds of poor mechanics have had a chance to catch a good mess for their families after their day's work was over. In addition to this, the dealers have reaped a good harvest, from the fact that they have had a better class of smelts, and received better prices. But perhaps I cannot do better than to give you a few extracts from letters sent me by gentlemen who take an interest in smelts. These are but a few of the many which have been sent, all expressing similar views. A gentleman, writing from Salem, says, "You have done a great and good work in increasing the smelts in this vicinity. It seems like old times to see the boys with their baskets well filled." Dr. E. J. Thompson, writing from Lynn, says, "It would do your soul good to come to Lynn and visit the wharves at the present time (October 12), and see the smelt-fishers at it,—old and young, rich and poor, split-bamboo and bean-poles, all together, and such smelt-fishing as they have not seen for years. Every one thought that smelt-fishing was played out; but now some of the best fishermen have caught as high as twenty and thirty dozen in one day." Benj. P. Ware, Esq., writing from Marblehead, after speaking of the wholesale and wasteful methods of slaughtering fish with seines and trawls, especially in the spawning season, says: "Smelts, which were becoming quite scarce, have this fall been very abundant. In Swampscott, where smelts in previous years have been almost unknown, they have been taken in great numbers, many of them weighing half a pound each. This change is doubtless due to the close time and legislative Acts passed in relation to the catching of smelts."

In this connection, I would say that many persons have, to my knowledge, made from ten to twenty dollars a day catching, legally,

with hook and line, so plenty have smelt become ; and I have no doubt that this winter, as the result of the law, hundreds of persons who perhaps could not get work, will be enabled to make excellent wages by catching through the ice. I have no hesitation in saying that the law has worked splendidly, and that another close time, next spring, will produce excellent results ; viz., still larger smelts, and in greater numbers.

Yours truly,

JOHN P. ORDWAY.

[D.]

CONCLUSIONS AS TO DECREASE OF COD-FISHERIES
ON THE NEW ENGLAND COAST.

[Report of U. S. Commissioner on Fisheries].

Of all the various fisheries formerly prosecuted directly off the coast of New England, north of Cape Cod, the depreciation in that of the cod appears to be of the greatest economical importance. Formerly the waters abounded in this fish to such an extent that a large supply could be taken throughout almost the entire year along the banks, especially in the vicinity of the mouths of the larger rivers. At that time the tidal streams were almost choked up with the alewives, shad and salmon that were struggling for entrance in the spring, and which filled the adjacent waters throughout a great part of the year.

As is well known, the erection of impassable dams across the streams, by preventing the ascent of the species just mentioned to their spawning-grounds, produced a very great diminution, and almost the extermination, of their numbers; so that, whereas in former years a large trade could be carried on during the proper season, now nothing would be gained by the effort.

Of late, the attention of the legislatures of the New England States has been called to this fact, and to the importance of restoring their fisheries, and a great deal has been already accomplished toward that end. Unfortunately, however, the lumbering interest in Maine, and the manufacturing in New Hampshire and Massachusetts, are so powerful as to render it extremely difficult to carry out any measures which in any way interfere with their convenience or profits; and, notwithstanding the passage of laws requiring the construction of fishways through the dams, these have either been neglected altogether, or are of such a character as not to answer their purpose. The reform, therefore, however imperatively required, has been very slow in its progress, and many years will probably elapse before efficient measures will be taken to remedy the evils referred to.

It would, therefore, appear that while the river-fisheries have been depreciated or destroyed by means of dams or by exhaustive fishing, the cod-fish have disappeared in equal ratio. This is not, however, for the same reason, as they are taken only with the line, at a rate

more than compensated by the natural fecundity of the fish. I am well satisfied, however, that there is a relation of cause and effect between the present and past condition of the two series of fish; and in this I am supported by the opinion of Capt. U. S. Treat, of Eastport, by whom, indeed, the idea was first suggested to me. Captain Treat is a successful fisherman, and dealer in fish on a very large scale, and, at the same time, a gentleman of very great intelligence and knowledge of the many details connected with the natural history of our coast fishes,—in this respect worthily representing Captain Atwood, of Provincetown. It is to Captain Treat that we owe many experiments on the reproduction of alewives in ponds, and the possibility of keeping salmon in fresh waters for a period of years. The general conclusions which have been reached, as the result of repeated conversations with Captain Treat and other fishermen on the coast, incline me to believe that the reduction in the cod and other fisheries, so as to become practically a failure, is due to the decrease off our coast in the quantity, primarily, of alewives; and, secondarily, of shad and salmon, more than to any other cause.

It is well known to the old residents of Eastport, that from thirty to fifty years ago cod could be taken in abundance in Passamaquoddy Bay and off Eastport, where only stragglers are now to be caught. The same is the case at the mouth of the Penobscot River and at other points along the coast, where once the fish came close into the shore, and were readily captured with the hook throughout the greater part of the year. That period was before the multiplication of mill-dams, cutting off the ascent of the alewives, shad and salmon,—especially the former. The Saint Croix River was choked in the spring with the numbers of these fish, endeavoring to ascend; and the same may be said of the Little River,—the outlet of Boynton's Lake,—about seven miles above Eastport. The lake in question is one of considerable size, and was visited by immense numbers of alewives, which could be dipped out, to any extent, on their passage upward, while the waters of the adjacent bay were alive with the young fish on their return.

The fish themselves enter the waters of the streams in May or June, and return almost immediately after spawning, to the sea. But they may be taken by the drift-nets along the shores as early as March and April; and, indeed, it is quite probable that the whole period of their abode in the salt water is spent adjacent to the rivers in which they were born. The young come down from the ponds in which they are hatched, from August to October, keeping up a constant stream of the young fish. In this way a supply of alewives was to be met with throughout the greater part of the

year, and nearer the coast they furnished every inducement for the cod and other ground fish to come in-shore in their pursuit.

It is true that the sea-herring is also an attraction to these fish, and probably but for their presence, our pollock, haddock and hake fisheries would be greatly diminished. Nevertheless, the alewife appears to be more attractive as a bait; and furthermore, the sea-herring are less constantly on the coast, especially in-shore, occurring as they do at stated intervals, when they come in from the deep sea to spawn. It is possible, too, that they are less easily captured by the cod, since they swim nearer the surface than the alewives. Corroboration of this idea is furnished in the testimony of Mr. W. B. McLaughlin, of Southern Head, Grand Manan. This gentleman informs me that the only stream in the island which ever furnished alewives to any extent was Seal Cove Creek, which discharges to the east of the southern extremity of Grand Manan, and into which these fish entered in immense numbers in the spring. At that time cod, haddock, and pollock, as well as halibut, were taken in great abundance in Seal Cove Sound, between Hardwood Cove, on Wood Island, and Indian or Parker's Point, on the main island. They were to be met with during the greater part of the year, especially from May to January; and the fishery in the channel-way, within a quarter of a mile of the shore, was really more productive than on the banks, much farther out to sea.

Although still a young man, Mr. McLaughlin recollects the capture of these fish; and, indeed, as a mere boy, enjoyed the sport within a very short distance of his father's house. Soon after that time a dam was built across this stream about two hundred yards above its mouth, cutting off entirely the upward passage of the alewives; and, by a remarkable coincidence, if it be nothing more, the cod-fishery in question diminished very soon after, and in a few years ceased almost entirely, so that up to the present time there are not enough cod in those waters to repay the experiment of attempting to catch them. A few alewives still find their way up to the foot of the dam, but in such small numbers as to make it often doubtful whether there are any there or not.

The other fishing-grounds about Grand Manan are farther out to sea, at the northern end of the island, where there are no alewives, and where herring appear to be the principal food, although the variation in the abundance of these, in different seasons, appears to have an important bearing upon the number of hake and cod.

If these conclusions be correct,—and I am quite satisfied of their general validity,—we have, for the efforts made to establish fishways in the rivers of Maine, New Hampshire and Massachusetts, a much more weighty reason than that of merely enabling a few

salmon to enter the streams in order to permit their capture while on their way.

Whatever may be the importance of increasing the supply of salmon, it is trifling compared with the restoration of our exhausted cod-fisheries; and should these be brought back to their original condition, we shall find, within a short time, an increase of wealth on our shores, the amount of which it would be difficult to calculate. Not only would the general prosperity of the adjacent States be enhanced, but in the increased number of vessels built, in the larger number of men induced to devote themselves to maritime pursuits, and in the general stimulus to everything connected with the business of the seafaring profession, we should be recovering, in a great measure, from that loss which has been the source of so much lamentation to political economists and well-wishers of the country.

[E .] *Salmon-hatching operations in the*

| Under whose auspices. | Place where spawn was collected. | Place where eggs were hatched. | In charge of Hatching. | Waters stocked. |
|-----------------------|--|--------------------------------|------------------------------|---|
| Maine. | Newcastle, Ont., . | Whiting, Me., . . | W. S. Peavey, . | Cobscook River. |
| | " " . | Alna, Me., . . | David C. Pottle, . | Sheepscot River. |
| | Miramichi R., N. B., | Augusta, Me., . . | | Kennebec River. |
| | Penobscot River, Or- land, Me. | Norway, Me., . . | Crockett & Holmes, | Androscoggin R. |
| | Penobscot River, } Bucksport, Me. } | Bucksport, Me., . | Charles G. Atkins, } | Penobscot River. St. Croix River. Androscoggin R. |
| New Hampshire. | Miramichi R., N.B., | Woodstock, N. H., . | W. W. Fletcher, . | Merrimac River. |
| | " " . | Concord, N. H., . | " . | " " |
| | " " . | Meredith, N. H., . | Robinson & Hoyt, . | " " |
| | " " . | " " . | " " . | " " |
| | Penobscot River, Bucksport, Me. | | | " " |
| | " " . | | W. W. Fletcher, . | " " |
| Vermont. | Miramichi R., N.B., | Charlestown, N. H., | Livingston Stone, . | Lake Champlain. |
| | " " . | " " . | " " . | Connecticut River. |
| | " " . | Chester, Vt., . . | A. D. Hager, . . | " " |
| | " " . | " . . | " . . | " " |
| | Penobscot River, Bucksport, Me. | Rochester, N. Y., . | Seth Green, . . | Lake Champlain. |
| Massachusetts. | Miramichi R., N. B., | E. Wareham, Mass., | S. T. Tisdale, . . | |
| | " " . | West Barnstable, Mass. | Dexter, Coolidge & Bacon. | Str'm on Cape Cod. |
| | " " . | Winchester, Mass., | E. A. Brackett, . | Mystic River. |
| | Penobscot River, Or- land, Me. | " " . | " " . | Str'm on Cape Cod. |
| | " " . | " " . | " " . | Merrimac River, |
| | Penobscot River, Bucksport, Me. | " " . | " " . | " " |
| | " " . | " " . | " " . | Mystic River. |
| Rhode Is. | " " . | " " . | " " . | Red Brook. |
| | Newcastle, Ont., . | Poneganset, R. I., . | | Pawtuxet River. |
| | Penobscot River, } Bucksport, Me. } | " " . | J. H. Barden, . | { Blackstone River. Pawtucket River. Pawcatuck River. } |

United States, between 1866 and 1872.

| Tributaries in which Fish were placed. | No furnished by U. S. Commission of Fish and Fisheries. | Date of Planting. | Total number of Fishes. | References. |
|--|---|-------------------|-------------------------|--|
| | . . | 1870 | 225 | Atkins's Report, p. 232. |
| | . . | 1871 | 1,500 | Fourth Report Commission of Fisheries, Maine, 1870, p. 28. |
| | . . | 1871 | 800 | { Sixth Report Commission of Fisheries, Maine, 1872, p. 15. |
| Little Androscog'n R. | . . | 1872 | 21,000 | |
| Tributaries, . . | 50,585 | 1873 | 67,000 | { Atkins's Report, Table XI., p. 288. |
| Tributaries, . . | 77,550 | 1873 | 10,000 | |
| Tributaries, . . | 98,150 | 1873 | 130,000 | |
| Pemigewasset River, | . . | 1866 | 15,000 | { Report Commission of Fisheries, New Hampshire, 1869, p. 6. |
| | . . | 1867 | 250 | |
| Pemigewasset River, | . . | 1869 | 5,000 | - - - |
| " " | . . | 1870 | 1,000 | Report Commission of Fisheries, New Hampshire, 1871, p. 6. |
| | . . | 1872 | 16,000 | { Report Commission of Fisheries, New Hampshire, 1873, p. 4. |
| | . . | 1873 | 160,000 | |
| Tributaries, . . | 14,000 | 1873 | 14,000 | Atkins's Report, Table XI., p. 288. |
| Winooski River, . | } | 1869 | 2,500 | { Report Fish Commission of Vermont, 1869, p. 11. |
| West River, . . | | | | |
| " | } | 1870 | 30,000 | { Report Fish Commission of Vermont, 1871-72, p. 5. |
| Williams River, . | | | | |
| Winooski and Lamoille Rivers. | 7,000 | 1873 | 7,000 | Atkins's Report, Table XI., p. 288. |
| Agawam River, (?) . | . . | 1870 | 3,000 | { Massachusetts Report, 1871, pp. 11, 12. |
| | . . | 1870 | 1,500 | |
| | . . | 1870 | 700 | |
| | . . | 1872 | 5,000 | { Massachusetts Report, 1873, p. 16. |
| Pemigewasset River, | . . | 1872 | 16,000 | |
| | 21,450 | 1873 | 165,000 | { Atkins's Report, Table XI., p. 288. |
| | 1,430 | 1873 | 11,000 | |
| | 1,430 | 1873 | 11,000 | |
| | . . | 1872 | 9,000 | Third Annual Rept. Rhode Island, p. 4, |
| | 6,400 | 1873 | 64,000 | Atkins's Report, Table XI., p. 288. |

Salmon-hatching operations in the United

| Under whose auspices. | Place where spawn was collected. | Place where eggs were hatched. | In charge of Hatching. | Waters stocked. |
|-----------------------|------------------------------------|--------------------------------|-----------------------------|-----------------------------|
| Connecticut. | Miramichi R., N. B., | Charlestown, N. H., | Livingston Stone, . | Great Brook. |
| | " " | " " | " " | " |
| | " " | Poquonnock, Conn., | Poquonnock Co., . | Quinnebaug River. |
| | Newcastle, Ont., . | " " | " " | Housatonic River. } |
| | " " | " " | " " | Farmington Riv'r. } |
| | " " | " " | " " | Quinnebaug Riv'r. } |
| | " " | " " | " " | Saugatuck River. |
| | " " | N. Branford, Conn., | Waltonian Hatching Society. | Farm River. |
| | " " | Middletown, Conn., | Robert G. Pike, . | Connecticut River. |
| | Penobscot River, Or- land, Me. | Poquonnock, Conn., | Poquonnock Co., . | Quinnebaug River. |
| | " " | " " | William Clift,* . | Great Brook. |
| | Penobscot River, Bucksport, Me. | " " | " " | Saugatuck River. |
| | " " | N. Branford, Conn., | Waltonian Hatch'g Society. | Southport River. |
| | " " | Westport, Conn., . | " " | Connecticut River. |
| | " " | " " | Waltonian Hatch'g Society. | Mystic River. |
| N. York. | " " | " " | " " | Thames River. |
| | " " | " " | " " | Housatonic River. |
| | " " | " " | " " | Stream at N. Bran- ford. |
| N. Jersey. | Penobscot River, Bucksport, Me. | Poquonnock, Conn., | William Clift,* . | Great Brook. |
| | Penobscot River, Bucksport, Me. | Caledonia Springs, N. Y. | Seth Green, . . | Hudson River, |
| | " " | " " | " " | Lake Ontario. |
| Penn. | " " | " " | " " | " " |
| | Penobscot River, Bucksport, Me. | Bloomsbury, N. J., | J. H. Slaek, M. D., . | Long Island Sound. |
| | " " | " " | " " | Raritan River. |
| Ohio. | " " | " " | " " | Delaware River. |
| | Newcastle, Ont., . | Dutchess Co., N. Y., | " " " " | Delaware River. |
| | " " | Easton, Pa., . | Thaddeus Norris, . | " " |
| Ohio. | Penobscot River, Bucksport, Me. | " " | " " | " " |
| | Penobscot River, Bucksport, Me. | Castalia, Ohio, . | John Hoyt, . . | Lake Erie. |

* Private enterprise.

States, between 1866 and 1872—Continued.

| Tributaries in which Fish were placed. | No. furnished by U. S. Commission of Fish and Fisheries. | Date of Planting. | Total number of Fishes. | References. |
|--|--|-------------------|-------------------------|---|
| Tributary to Long Island Sound, . . . | . . . | 1870 | 2,000 | } Atkins's Report, p. 230. |
| “ “ . . . | . . . | 1871 | 90 | |
| Broad Brook, . . . | . . . | 1871 | 1,876 | Connecticut Report, 1871, p. 20. |
| Tributaries, . . . | . . . | 1871 | 8,000 | Connecticut Report, 1872, p. 28. |
| Tributaries, . . . | . . . | 1872 | †7,377 | } Connecticut Report, 1872, pp. 27, 28. |
| | . . . | 1872 | †900 | |
| Little River, . . . | . . . | 1872 | †600 | |
| Tributaries, . . . | . . . | 1872 | 17,000 | Connecticut Report, 1872, p. 28. |
| | . . . | 1872 | 5,000 | Atkins's Report, p. 241. |
| | 1,365 | 1873 | 4,500 | } Atkins's Report, Table XI., p. 288. |
| | 1,365 | 1873 | 4,500 | |
| Tributaries, . . . | 34,880 | 1873 | 115,000 | |
| | 1,500 | 1873 | 5,000 | |
| Tributaries, . . . | 3,000 | 1873 | 10,000 | |
| | 21,200 | 1873 | 70,000 | } |
| | 10,100 | 1873 | 35,000 | |
| | . . . | 1873 | 43,000 | |
| Peating and Inglesby Creeks, . . . | 30,000 | 1873 | 30,000 | } Letter from Seth Green. |
| Salmon River, . . . | 15,000 | 1873 | 15,000 | |
| Oswego River, . . . | 15,000 | 1873 | 15,000 | |
| Small tributaries, . . . | 2,500 | 1873 | 2,500 | } Letter from Seth Green. |
| Headwaters, . . . | 15,000 | 1873 | 15,000 | |
| Museoneteong Creek, . . . | 18,000 | 1873 | 18,000 | |
| Bushkill River, . . . | . . . | 1871 | 2,500 | Pennsylvania Report, 1873, p. 15. |
| “ . . . | . . . | 1872 | 11,000 | Pennsylvania Report, 1873, p. 16. |
| Heitzman Spr'g Br'k, . . . | 25,000 | 1873 | 25,000 | - - - |
| Castalia Spr'g stream, . . . | 2,500 | 1873 | 2,500 | Atkins's Report, p. 288. |

† Doubtful. The distribution was proposed in 1872, and no subsequent references made.

Salmon-hatching operations in the United

| Under whose auspices. | Place where spawn was collected. | Place where eggs were hatched. | In charge of Hatching. | Waters stocked. |
|--------------------------|-------------------------------------|-----------------------------------|---------------------------|-------------------|
| Michigan. | Penobscot River, Bucksport, Me. | Clarkston, Mich., . | Nelson W. Clark, . | Lake Saint Clair. |
| | " " | " " . | " " . | Lake Erie. |
| | " " | " " . | " " . | " |
| | " " | " " . | " " . | " |
| | " " | " " . | " " . | " |
| | " " | " " . | " " . | " |
| | " " | " " . | " " . | " |
| | " " | " " . | " " . | " |
| | " " | " " . | " " . | Lake Michigan. |
| | " " | " " . | " " . | " |
| | " " | " " . | " " . | " |
| | " " | " " . | " " . | " |
| | " " | " " . | " " . | " |
| | " " | " " . | " " . | " |
| | " " | " " . | " " . | " |
| | " " | " " . | " " . | Lake Huron. |
| Wisconsin. | Penobscot River, Bucksport, Me. | Waterville, Wis., . | H. F. Dousman, . | Lake Michigan. |
| | " " | " " . | " " . | " |
| | " " | " " . | " " . | " |
| | Total, . . . | | | |

States, between 1866 and 1872—Concluded.

| Tributaries in which Fish were placed. | No. furnished by U. S. Commis- sion of Fish and Fisheries. | Date of Planting. | Total number of Fishes. | References. |
|---|---|-------------------|----------------------------|---------------------------------|
| Lord's Lake, | | 1873 | 400 | } Information from N. W. Clark. |
| Orchard Lake, | | 1873 | 500 | |
| Walled Lake, | | 1873 | 500 | |
| Whitmore Lake, | | 1873 | 500 | |
| Gun Lake, | | 1873 | 500 | |
| Barrier Lake, | | 1873 | 500 | |
| Diamond Lake, | | 1873 | 1,000 | |
| Barren Lake, | | 1873 | 500 | |
| Lake near Marshall, | | 1873 | 500 | |
| Headwaters St. Joseph River, | | 1873 | 500 | |
| North Branch St. Joseph River, | | 1873 | 1,000 | |
| “ “ “ “ | | 1873 | 1,000 | |
| Stream tributary to St. Joseph River, | | 1873 | 1,500 | |
| Headwaters Kalamazoo River, | | 1873 | 500 | |
| Grand River, | | 1873 | 500 | |
| Muskegon River, | | 1873 | 1,500 | } Letter of H. F. Dousman. |
| Manistee River, | | 1873 | 1,500 | |
| Ausable River, | | 1873 | 2,000 | |
| Menomonee River, | | 1873 | 7,000 | |
| Oconomowoc Lake, | | 1873 | 1,000 | |
| Milwaukee River, | 33,900 | 1873 | 11,000 | |
| | 517,805 | - | 1,258,841 | |

Table of the distribution of young Shad

| Shad-hatching Stations where young Shad were procured. | Waters stocked with Shad. | Name of City or Village. |
|---|--------------------------------|----------------------------|
| <i>Conducted by U. S. Commission.</i> | | |
| Coeymans, N. Y., Hudson River, . . . | Alleghany River, . . | Salamanca, N. Y. |
| | Mississippi River, . . | Saint Paul, Minn. |
| South Hadley Falls, Mass., Connecticut River, | Alleghany River, . . | Salamanca, N. Y. |
| | Cuyahoga River, . . | Kent, Ohio. |
| | White River, . . . | Indianapolis, Ind. |
| | Missouri River, . . . | Washington and Herman, Mo. |
| Washington, D. C., Potomac River, . . . | Platte River, . . . | Denver, Colorado. |
| | Greenbrier River, . . | Bonceive, W. Va. |
| Coeymans, N. Y., Hudson River, . . . | New River, . . . | Central Station, Va. |
| | Calumet River, . . . | South Chicago, Ill. |
| | Fox River, . . . | Appleton, Wis. |
| Lambertsville, N. J., Delaware River, . . | Ashtabula River, . . | Ashtabula, Ohio. |
| | Monongahela River, . . | Greensburg, Pa. |
| Coeymans, N. Y., Hudson River, . . . | Wabash River, . . . | Logansport, Ind. |
| | Jordan River, . . . | Jordan, Utah. |
| | Sacramento River, . . | Tehama, Cal. |
| South Hadley Falls, Mass., Connecticut River, | Winooski River, . . . | Burlington, Vt. |
| | Housatonic River, . . | New Milford, Conn. |
| | Penobscot River, . . | Mattawaumkeag, Me. |
| | Otter Creek, . . . | Vergennes, Vt. |
| | Detroit River, . . . | Detroit, Michigan. |
| <i>Conducted by N. H. Commission.</i> | Grand River, . . . | Ionia, Michigan. |
| | Lake Winnepeiseogee, | |
| North Andover, Mass., Merrimac River, . . | " " | |
| | " " | |
| | " " | |
| <i>Conducted by Vermont Commission.</i> | | |
| South Hadley Falls, Mass., Connecticut River, | (Not recorded), | |
| | Merrimac River, . . | Concord, Vt. |
| Coeymans, N. Y., Hudson River, . . . | Lake Champlain, . . | Burlington, Vt. |
| <i>Conducted by Massachusetts Commission.</i> | | |
| South Hadley Falls, Mass., Connecticut River, | Whitney's Pond, . . | —, Mass. |
| North Andover, Mass., Merrimac River, . . | Mystic River, . . . | Winchester, Mass. |
| | Ipswich River, . . . | |

a A few fry.

b A certain amount of spawn.

c Some spawn.

in the waters of the United States.

| Date of Planting. | No. of Shad when starting. | No. of Shad at destination. | Time young Shad remained in the cans. | In charge of Transfer. |
|-------------------|----------------------------|-----------------------------|---------------------------------------|---|
| June 30, 1872, | 25,000 | 25,000 | Ab't 7 h. 30 m. | Jonathan Mason. |
| July 5, " | 25,000 | 25,000 | Ab't 60 h. | J. Mason and Chester Green. |
| 3, " | 2,000,000 | 400,000 | 24 h. 30 m. | } Rev. William Clift. |
| 3, " | . . | <i>a</i> | 35 h. 15 m. | |
| 4, " | . . | 400,000 | 48 h. | |
| 5, " | . . | <i>a</i> | 78 h. 25 m. | |
| 7, " | . . | 2,000 | 124 h. 30 m. | |
| 6, 1873, | 50,000 | 30,000 | 15 h. 15 m. | James W. Milner. |
| June 10, 1873, | 40,000 | 40,000 | 25 h. 30 m. | H. W. Welsher. |
| 16, " | 70,000 | 70,000 | 38 h. | } James W. Milner and J. Ma- son. |
| 20, " | 70,000 | 70,000 | 62 h. | |
| 24, " | 50,000 | 50,000 | 25 h. | Jonathan Mason. |
| 25, " | 15,000 | 15,000 | 15 h. | J. H. Slack, M. D. |
| 30, " | 40,000 | 40,000 | 40 h. | James W. Milner and J. Ma- son. |
| 30, " | 40,000 | 5,000 | Ab't 121 h. | } Livingston Stone and H. W. Welsher. |
| July 2, " | - | 35,000 | 170 h. 30 m. | |
| 5, " | 100,000 | 100,000 | 15 h. | } James W. Milner and J. Ma- son. |
| 8, " | 90,000 | 90,000 | 5 h. | |
| 12, " | 100,000 | 100,000 | 28 h. | |
| 20, " | 100,000 | 100,000 | 12 h. | |
| 24, " | 100,000 | 20,000 | 44 h. | |
| 24, " | . . | 80,000 | 53 h. 30 m. | |
| 1868, . . . | . . | <i>b</i> | . . . | - - |
| 1869, . . . | . . | 400,000 | . . . | William W. Fletcher, M. D., and W. A. Sanborn. |
| 1870, . . . | . . | <i>c</i> | . . . | - - |
| 1872, . . . | . . | <i>d</i> | . . . | - - |
| 1867, . . . | . . | <i>e</i> | . . . | Albert D. Hager and Charles Barrett. |
| 1867, . . . | . . | <i>f</i> | . . . | William W. Fletcher, M. D. |
| 1872, . . . | . . | 50,000 | . . . | - - |
| 1867, . . . | . . | 5,000 | . . . | - - |
| 1868, . . . | . . | <i>b</i> | . . . | - - |
| 1869, . . . | . . | 100,000 | . . . | - - |

d Several thousands of eggs.*e* A few in a bottle.*f* Several millions. (?)

Table of the distribution of young Shad

| Shad-hatching Stations where young Shad were procured. | Waters stocked with Shad. | Name of City or Village. |
|---|---------------------------------------|--------------------------|
| <i>Mass. Commission—Continued.</i> | | |
| North Andover, Mass., Merrimac River, . | Concord River, | |
| | Weweantit River, | |
| | Eel River, | |
| | Newmarket River, | |
| | Mystic River, | Winchester, Mass. |
| | “ | |
| South Hadley Falls, Mass., Connecticut River, | “ | ——, Mass. |
| <i>Conducted by Rhode Island Commission.</i> | | |
| South Hadley Falls, Mass., Connecticut River, | Blackstone River, | } |
| | Pawtuxet River, | |
| | Pawcatuck River, | |
| <i>Conducted by Connecticut Commission.</i> | | |
| South Hadley Falls, Mass., Connecticut River, | Poquonnock River, | Mystic, Conn. |
| | Saugatuck River, | Westport, Conn. |
| | “ | “ “ |
| <i>Conducted by New York Commission.</i> | | |
| Coeymans, N. Y., Hudson River, | Genesee River, | Rochester, N. Y. |
| | “ | “ “ |
| | Lake Champlain, | Whitehall, N. Y. |
| | Mohawk River, | ——, N. Y. |
| | Genesee River, | Rochester, N. Y. |
| | Lake Onondaga, | Syracuse, N. Y. |
| | Canandaigua Lake, | Canandaigua, N. Y. |
| | Cayuga Lake, | |
| | Genesee River, | Rochester, N. Y. |
| <i>Conducted by Michigan Commission.</i> | | |
| Washington, D. C., Potomac River, | Potomac River, ^a | Cumberland, Md. |
| Coeymans, N. Y., Hudson River, | Grand River, | Lansing, Michigan. |
| | Raisin River, | Monroe, Michigan. |
| | Grand River, | Lansing, Michigan. |
| <i>Conducted by California Commission.</i> | | |
| Coeymans, N. Y., Hudson River, | Lake Erie, | Cleveland, Ohio. |
| | “ | Toledo, Ohio. |
| | Lake Michigan, | Chicago, Illinois. |
| | Bear River, | Ogden, Utah. |
| | Sacramento River, | Tehama, California. |

^a Destined for Grand River, Michigan. Finding that they were dying rapidly, the remaining living ones were put into the Potomac River. A trip of forty hours is too long for one man to attempt to carry shad successfully.

in the waters of the United States—Concluded.

| Date of Plant- ing. | No. of Shad when start- ing. | No. of Shad at destina- tion. | Time young Shad remained in the cans. | In charge of Transfer. |
|------------------------|------------------------------------|-------------------------------------|---|-------------------------------------|
| | . . | 180,000 | . . . | - - |
| | . . | 100,000 | . . . | - - |
| | . . | 100,000 | . . . | - - |
| | . . | 100,000 | . . . | - - |
| | . . | 1,125,000 | . . . | - - |
| 1870, | . . | c | . . . | - - |
| 1872, | . . | b | . . . | - - |
| 1872, | . . | 750,000 | . . . | Robert Holmes. |
| 1871, | . . | 1,500,000 | . . . | Rev. William Clift. |
| 1871, | 5,000,000 | d | . . . | } E. M. Lees. |
| 1872, | b | . . | . . . | |
| June 30, 1870, | . . | e | Ab't 10 h. | - - |
| 8, 1871, | . . | 15,000 | Ab't 10 h. | - - |
| -, " | . . | 50,000 | Ab't 4 h. 30 m. | - - |
| 18, 1872, | . . | 150,000 | . . . | - - |
| 21, " | . . | 60,000 | Ab't 10 h. | - - |
| 25, " | . . | 30,000 | Ab't 6 h. | - - |
| 12, 1873, | . . | 54,000 | Ab't 10 h. | } Oren Chase. |
| 16, " | . . | 54,000 | Ab't 9 h. | |
| 19, " | . . | 70,000 | Ab't 10 h. | Monroe A. Green. |
| June 5, 1873, | 50,000 | 10,000 | Ab't 9 h. | N. W. Clark. |
| 17, " | 80,000 | 80,000 | Ab't 45 h. | N. W. Clark and George Clark. |
| 23, " | . . | } 50,000 | Ab't 44 h. } | George H. Jerome and Oren Chase. |
| 28, " | . . | | | |
| June 20, 1871, | } 12,000 } | 200 | 25 h. 45 m. | } Seth Green. |
| 20, " | | f | . . . | |
| 21, " | | 200 | 51 h. | |
| 23, " | | 200 | 104 h. | |
| 26, " | | 10,000 | 184 h. | |

b A few thousands.

c Some spawn.

d Not on record.

e A few shad.

f Not stated.

Table of Shad-hatching

| Year. | PLACE OF OPERATION. | River. | Superintendent. | Beginning. |
|-------|---------------------------------------|-------------------------|--------------------------------------|------------|
| 1873 | <i>Conducted by U. S. Commission.</i> | | | |
| | Augusta, Ga., | Savannah, | Seth Green, | Apr. 21, |
| | New Berne, N. C., | Neuse, | | May 1, |
| | Weldon, N. C., | Roanoke, | | 15, |
| | Washington, D. C., | Potomac, | James W. Milner, | May 17, |
| | Lambertsville, N. J., | Delaware, | J. H. Slack, | June 10, |
| | Topsham, Me., | Androscoggin, | James W. Milner, | July 14, |
| 1868 | <i>Conducted by Maine Commission.</i> | | | |
| | Augusta, Me., | Kennebec, | N. W. Foster and Chas. G. Atkins. | June 28, |
| 1873 | Bowdoinham, Me., | | Henry O. Stanley, | 15, |
| 1867 | <i>Conducted by Mass. Commission.</i> | | | |
| 1868 | South Hadley Falls, Mass., | Connecticut, | Seth Green, | July 1, |
| | | | | June 20, |
| 1868 | North Andover, Mass., | Merrimac, | A. C. Hardy, | 24, |
| | | | | |
| 1869 | North Andover, Mass., | Merrimac, | J. M. Gage, | 1, |
| 1869 | North Andover, Mass., | Merrimac, | A. C. Hardy, | June 10, |
| 1870 | | | | June 1, |
| 1871 | | | | May 20, |
| 1872 | | | | June 2, |
| 1870 | <i>Conducted by Conn. Commission.</i> | | | |
| | South Hadley Falls, Mass., | Connecticut, | James Rankin, | June 16, |
| 1871 | South Hadley Falls, Mass., | Connecticut, | Charles C. Smith, | June 15, |
| 1872 | | | | 24, |
| 1873 | | | | 23, |
| 1868 | <i>Conducted by N. Y. Commission.</i> | | | |
| 1869 | Coeymans, N. Y., | Hudson, | Seth Green, | June 18, |
| 1870 | | | | 1, |
| 1871 | | | | May 25, |
| 1872 | | | | 18, |
| 1872 | | | | 17, |
| 1873 | | | | 20, |
| 1873 | <i>Conducted by Penn. Commission.</i> | | | |
| 1873 | Newport, Pa., | Juniata, | Edward Boehme, | May 10, |
| | Marietta, Pa., | | H. W. Welsher, | |

a Water at noon, 67°.9.

b Over 1,000.

c None.

d Not recorded.

e A large number.

f Several millions.

operations in the United States.

| Ending. | Average temperature of water. | | Shad taken. | Males. | Females. | Ripe females. | Number of Eggs. | Young Shad released. | Young Shad sent to distant waters. |
|----------|-------------------------------|---------|-------------|--------|----------|---------------|-----------------|----------------------|------------------------------------|
| | Morn'g. | Even'g. | | | | | | | |
| Apr. 28, | - | - | 13 | - | - | c | - | - | - |
| May 14, | 64.6 | 65.6 | 57 | - | - | 2 | 50,000 | 43,000 | - |
| 29, | - | - | - | - | - | c | - | - | - |
| June 10, | 68.2 | 71.9 | 3,605 | - | - | 111 | 2,170,000 | 1,370,000 | 140,000 |
| 30, | 73.2 | 78 | 169 | - | - | 29 | 495,000 | 433,000 | 15,000 |
| 16, | - | - | 16 | - | - | c | - | - | - |
| July 4, | 70 | 75 | - | - | - | - | 100,000 | 50,000 | - |
| . . | - | - | - | - | - | - | - | 100,000 | - |
| July 21, | - | - | - | - | - | - | - | 40,000,000 | g 5,000 |
| 16, | - | - | - | - | - | - | - | 60,000,000 | - |
| 15, | - | - | - | - | - | - | - | d | h |
| . . | - | - | - | - | - | - | - | e | - |
| July 11, | 65.8 | 68.2 | 1,442 | - | - | - | 2,570,000 | e | - |
| 27, | a | - | 1,590 | 1,105 | 567 | - | 2,160,000 | - | 2,105,000 |
| 19, | 69.8 | 74.4 | 934 | 401 | 533 | - | 1,861,000 | - | i |
| 22, | - | 68 | 4,289 | 3,053 | 1,236 | - | 4,530,000 | - | - |
| 24, | - | 70 | 2,447 | 1,479 | 968 | - | 5,823,000 | - | j |
| July 7, | 66.7 | 75.3 | - | - | - | - | 54,620,000 | - | - |
| 14, | 70.5 | 73 | 4,783 | 2,421 | 2,362 | - | 63,177,000 | - | 6,500,000 |
| 22, | 77.6 | 79.2 | 3,598 | 946 | 2,652 | - | 92,065,000 | - | k 2,750,000 |
| 28, | - | - | 3,013 | 1,051 | 1,962 | - | 44,556,000 | - | - |
| . . | - | 77 | - | - | - | - | - | f | - |
| July 13, | - | - | - | - | - | - | - | 15,000,000 | - |
| 7, | - | 76.5 | 1,354 | - | - | 110 | 2,604,000 | - | l |
| 5, | 72.9 | 75.3 | 3,758 | - | - | 480 | 8,620,000 | 8,059,600 | 127,000 |
| 2, | 66.4 | 69.5 | 4,527 | - | - | 439 | 8,750,000 | 6,177,000 | 290,000 |
| 30, | 67.3 | 70.6 | 1,643 | - | - | 293 | 5,740,000 | 4,503,000 | 658,000 |
| June 15, | - | - | b | - | - | 43 | 1,500,000 | - | 20,000 |
| . . | - | - | - | - | - | - | - | 500,000 | - |

g And several millions.

h A certain amount of spawn.

i Some spawn.

j Several thousand eggs.

k And a few thousand.

l A few shad.

[F.]

[Chapter 137.]

AN ACT to extend the time within which Actions and Prosecutions under the laws relating to Inland Fisheries may be commenced.

Be it enacted, &c., as follows:

SECT. 1. Section thirty-two of chapter three hundred eighty-four of the Acts of eighteen hundred sixty-nine is amended by striking out the words "four months," and inserting the words "one year" instead thereof.

SECT. 2. This Act shall take effect on its passage. [*Approved March 29, 1873.*]

[Chapter 195.]

AN ACT to regulate the leasing of great ponds for the purpose of Cultivating useful Fishes.

Be it enacted, &c., as follows:

SECT. 1. It shall be the duty of the Commissioners on Inland Fisheries in all cases where application is made for the lease of any great pond for the purpose named in section nine of chapter three hundred and eighty-four of the Acts of eighteen hundred and sixty-nine, to give notice of said application to the town or city within whose limits said pond lies, and of the time and place appointed for a hearing thereon.

SECT. 2. The several towns and cities in the Commonwealth are authorized to take leases of any great ponds within their respective limits, for the purpose of cultivating useful fishes, under such conditions and restrictions as the Commissioners on Inland Fisheries may prescribe, and may make appropriations to carry out the provisions of this Act.

SECT. 3. This Act shall take effect on its passage. [*Approved April 15, 1873.*]

[Chapter 110.]

AN ACT providing for the Preservation of Lobsters.

Be it enacted, &c., as follows:

SECT. 1. Whoever takes, sells, or offers for sale, or has in his possession with intent to sell, either directly or indirectly, any lobster less than ten and one-half inches in length, measuring from one extreme of the body to the other, exclusive of claws or feelers, shall forfeit for every such lobster five dollars.

SECT. 2. All forfeitures accruing under this Act shall be paid, one-half to the person making the complaint, and one-half to the city or town where the offence is committed.

SECT. 3. This Act shall take effect on the first day of May, eighteen hundred and seventy-four. [*Approved March 28, 1874.*]

[Chapter 135.]

AN ACT in addition to an Act to regulate the leasing of great ponds for the purpose of Cultivating useful Fish.

Be it enacted, &c., as follows:

SECT. 1. Any town in this Commonwealth may, either alone or jointly with any other town, take a lease of any great pond for the purposes named in section two of chapter one hundred and ninety-five of the Acts of the year one thousand eight hundred and seventy-three, and may make appropriations therefor.

SECT. 2. This Act shall take effect upon its passage. [*Approved April 1, 1874.*]

[Chapter 144.]

AN ACT to regulate Fishing in the Connecticut and Merrimac rivers.

Be it enacted, &c., as follows:

SECT. 1. From and after the passage of this Act, whoever takes or catches any shad or alewives in any part of the Merrimac river, or its tributaries lying within this Commonwealth, except between sunrise on Monday morning and sunrise of Thursday morning of each week from the first day of March to the tenth day of June in each year, shall forfeit for each alewife so taken, a sum not less than one nor more than five dollars; and for each shad so taken, a sum not less than five nor more than twenty dollars.

SECT. 2. Whoever takes or catches any salmon in any part of the Connecticut or Merrimac rivers, or their tributaries lying within this Commonwealth, for a period of six years from and after the passage of this Act, shall be punished for each offence by a fine of not less than fifty nor more than two hundred dollars, or by imprisonment in the House of Correction not less than two nor more than six months; *provided*, that any person catching salmon, when seining for other fish, and not retaining the same, shall not be subject to the penalty provided in this section.

SECT. 3. Whoever takes or catches any fishes within four hundred yards of any fishway now built, or hereafter to be built, on the Connecticut river or its tributaries lying within this Commonwealth, or trespasses within the limits of such fishway, shall forfeit for each offence the sum of fifty dollars.

SECT. 4. Whoever uses any gill-net, of any size or description, in the waters of the Connecticut or Merrimac Rivers or their tributa-

ries lying within this Commonwealth, shall forfeit for each offence the sum of twenty-five dollars.

SECT. 5. Whoever takes or catches any fish in violation of the provisions of this Act shall, in addition to the penalties herein prescribed, forfeit any boat, net, line, rod or other apparatus used in such taking or catching.

SECT. 6. If the mayor and aldermen of any city, or the selectmen of any town, bordering on either the Connecticut or Merrimac Rivers, shall neglect to appoint and fix the compensation of fishwardens within their respective cities and towns as now required by law, the city or town in which such neglect occurs shall forfeit a sum not less than one hundred nor more than five hundred dollars. [*Approved April 7, 1874.*]

[Chapter 153.]

AN ACT in addition to Acts in relation to Smelt-Fisheries.

Be it enacted, &c., as follows :

SECT. 1. Whoever within this Commonwealth offers for sale or has in his possession any smelt or smelts, between the fifteenth day of March and the first day of June in each year, shall forfeit for each and every smelt so sold, offered for sale, or had in his possession, the sum of one dollar.

SECT. 2. Whoever takes or catches any smelt or smelts with a net of any kind, or in any other manner than by naturally and artificially-baited hooks and hand-lines, shall forfeit for each smelt so caught or taken the sum of one dollar. *Provided*, that nothing contained in this Act shall apply to any person catching smelts in any seine or net within the limits of Bristol, Barnstable or Dukes Counties, during the time and in the manner a person may lawfully fish for perch, herring or alewives; or to any person offering for sale or having in his possession smelts so caught within those limits; and, in all prosecutions under this Act, the burden of proof shall be upon the defendant to show that the smelt or smelts, the offering for sale, possession or catching of which is the subject of the prosecution, were legally caught.

SECT. 3. The mayor and aldermen of any city, the selectmen of any town, and all police-officers and constables within this Commonwealth shall cause the provisions of this Act to be enforced within their respective cities and towns; and all forfeitures and penalties for violations of the provisions of this Act shall be paid one-half to the person making the complaint and one-half to the city or town in which the offence is committed.

SECT. 4. All acts conflicting with this Act are hereby repealed. [*Approved April 9, 1874.*]

[Chapter 186.]

AN ACT for the protection of Trout, Land-locked Salmon and Lake-Trout.

Be it enacted, &c., as follows:

SECT. 1. Whoever takes or catches any trout, land-locked salmon or lake-trout within the limits of this Commonwealth; or buys, sells, or has in possession the same, taken within said limits between the twentieth day of August and the twentieth day of March in each year; or takes or catches any trout, land-locked salmon or lake-trout with any net or salmon-pot, at any season of the year, shall forfeit for each fish so caught a sum not less than five nor more than twenty dollars.

SECT. 2. The twenty-eighth section of the three hundred and eighty-fourth chapter of the Acts of eighteen hundred and sixty-nine is repealed. [*Approved April 24, 1874.*]

TENTH ANNUAL REPORT

OF THE

COMMISSIONERS

ON

INLAND FISHERIES,

FOR THE

YEAR ENDING JANUARY 1, 1876.

BOSTON :

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1876.

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Commonwealth of Massachusetts.

To His Excellency the Governor and the Honorable Council.

The Commissioners on Inland Fisheries beg leave to present their Tenth Annual Report.

FISHWAYS.

The fishways throughout the State have generally proved so successful that there seems to be little or no doubt that we have selected the best form for the passage of all kinds of fish; especially is this true where ways are to be built over high dams. The difficulty has been to know what kind of way is best suited to *shad*, and this question has been rendered more perplexing from the fact that wherever we have been called upon to open a passage-way for these fish, all belonging above the dam have been destroyed, and there was no disposition on the part of those below to go above their spawning-ground. To obviate this, both spawn and young fish have been deposited as far up the rivers as our limited means would permit. The female shad and salmon do not return to the place where they were hatched until they are ready to produce spawn, which takes from three to four years. The males, however, are capable of doing duty when they are only one year old, and not unfrequently accompany the mature females to their spawning-grounds. This necessarily causes a delay in testing the fishways, and it is no evidence that the way is not suitable, even though there are thousands *below*, provided none have been bred above. It is not an easy matter to make some people understand this, and consequently a good deal of fault has been found because the Commissioners have not been able to change the habits of these fish. It is very commonly supposed that all that is

necessary to restore our rivers to their former productiveness is to build good fishways over the dams. If, when these structures were thrown across our rivers, the people had been as sensitive to their rights as they now are, and not waited until the fish were killed out, much time, labor and expense would have been saved.

Efforts were made last year to improve the surroundings at the foot of the Holyoke fishway, which were only partially successful, owing to the freshet, last spring, cutting a channel outside of the work. No change was made in the fishway, as none appeared to be needed. In this opinion we were fully sustained by all who had carefully studied its workings, and whose experience in this direction entitled their judgment to consideration.

The fishway was, last spring, put under the care of Charles D. Griswold, of South Hadley, who closed it twice a day for the purpose of noting what was in it. A great number of silver eels, lamper eels and suckers went through into the river above; also, quite a number of black bass, striped bass, chubs, perch, bream and a variety of smaller fry made their way through. On the 5th of July, Mr. Griswold found two yearling shad near the upper end of the way, and subsequently quite a number of these fish passed over. On July 6, among the yearlings was found one mature shad, measuring nineteen inches, and weighing about four pounds. These facts are important; first, as showing that it was the yearling male shad, bred above, that led the way and probably attracted the others; secondly, these fish, having passed freely over, the question whether the Holyoke fishway is a suitable one for the passage of shad is settled. All efforts hereafter will be directed to putting fish above the dam, and such improvements as can be made around the foot of the way.

The plan of the Holyoke fishway was adopted by a unanimous vote of the Commissioners of the four States interested, and it is a matter of congratulation that it has proved capable of doing the work for which it was designed. It is the only fishway built over any considerable height of dam, where shad are positively known to have passed.

With plenty of young shad deposited well up the river, and such improvements as we hope to make at the foot of the

way, there seems to be no good reason why the inhabitants above may not receive their full share of fish.

Already some of the people about Turner's Falls have sent their compliments for the supply of lamper eels, forwarded to them through the fishway.

Lawrence Fishway.

At the time the Lawrence fishway was built, it was thought best to locate it on the south side of the river, running along the bank and ending below the pool at the foot of the dam. The upper end was connected with the dam by means of a platform which could be raised in time of freshets as a protection to the works. This location was determined on, partly from the opinion of the engineer that it would not be safe to turn it back, and partly from the fact that the fish made their way up on this side.

All the smaller fish, such as alewives, suckers, chubs, pouts and perch, still pass up this way and go through the fishway; but, from a change in the current, or some other cause, the shad now run up the middle of the river, directly into the pool below the dam, and, in order to reach the foot of the way, would be obliged to drop back into quick water, which they are not likely to do. The question of turning the fishway back, so that the foot would rest, or end, in or near the pool, has long been under consideration. That some arrangement of this kind would eventually be required, was evident. The State having, by unwise legislation, parted with more or less of its rights in the charter granted to the Essex Company, it followed that whatever expense was incurred by this alteration must be borne by the Commonwealth. As a matter of economy, it was thought best not to make this change until further experience had been gained with the Holyoke fishway; but the people along the river became restless, and, near the close of the last session, called for and obtained an appropriation, to be used at the discretion of the Commissioners, in improving the fishway. The sum granted was not based upon any estimate of what would be required, for, with the works at that season partially under water, it was hardly possible to form any definite idea of what it would cost.

At the close of the season, it having been demonstrated

beyond a doubt that shad would pass with perfect ease through the whole length of the Holyoke fishway—four hundred and forty feet—into the river above, it was decided to use the appropriation made for improving the Lawrence. Plans were drawn of the whole top-hammer, similar to that of the Holyoke, the drop between the fishway and the dam removed, and the connection made by means of a timbered spout. This will save, annually, the expense of removing that part of the fishway in the fall and putting it down again in the spring. Starting about one hundred feet from the foot, new works have been constructed leading to the pool below the dam. About two hundred feet of the old way remain, and the plans made contemplate the completion of the whole in keeping with the new work; but to do this a further appropriation will be required.

Neponset River.

In 1871, a very large petition, numbering several hundred names, was received by the Commissioners, asking for the opening of Neponset River for the passage of migratory fish. The ways were promptly built; but, with the exception of the individual exertions of Mr. Estey, no efforts have been made to restock the river. Nor have the towns bordering on the river ever appointed fish wardens to look after the fishways. We think that, upon reflection, the petitioners will see that this negligence is not creditable to themselves nor just to the mill-owners.

Taunton River.

A petition from the fish committee of Halifax, selectmen of Bridgewater, fish committee of East Bridgewater, and selectmen of Middleborough has been received asking for a change in the old fishway on the Taunton River, at the place known as Squawbetty Dam. The present way appears to answer very well for the passage of alewives, and as there are no other migratory fish bred above the dam, it seems unnecessary to put the owner to the expense of building a new fishway, unless there is assurance given that the parties interested will stock the waters above with shad or salmon. The California salmon would possibly do well in this

river. The spawn and fry of both these species of fish can be had on application to the Commissioners. The excessive fishing at Middleborough, where for five days and five nights in each week not a solitary fish is allowed to pass, if continued for any great length of time, will probably so deplete the river that the fishway at Squawbetty will no longer be wanted even for alewives.

Palmer River.

An application from the selectmen of Swansey for a fishway on Palmer River has been considered, and it has been decided that further legislation is desirable.

The difficulties arising from a conflict of ownership at the dam controlling the entrance of the fish to the Weweantit River has been settled, and Mr. Robinson has given assurance that the fishway shall be in good running order before the fish arrive next spring.

Persistent efforts have been made during the last three years to induce the New Hampshire Commissioners to cause a fishway to be built at Nashua on the Nashua River, but up to the present time we are not aware that anything has been done, or that the owners of the dam have been officially notified that such a demand has been made by this State.

A considerable progress has been made in blasting and grading for the fishway at Turner's Falls. Mr. Wendell T. Davis, treasurer of the company, in answer to inquiries, replies as follows:—

TREASURER'S OFFICE, TURNER'S FALLS COMPANY, }
GREENFIELD, MASS., Dec. 14, 1875. }

MR. E. A. BRACKETT.

SIR:—In reply to your favor of December 13, I have to say that our fishway at Turner's Falls is practically completed for the passage of salmon. Only a narrow ridge of rock is left unblasted, near the crest of the dam, which can be readily removed whenever required.

I am, yours,

WENDELL T. DAVIS.

ALEWIFE (Alosa tyrannus).

There has been a scarcity of these fish in some localities, and quite an increase in others. The reason of the deficiency,

if not attributable to seining and netting, may readily be traced in part to last year's fishing, but mainly to causes extending back four or five years. In almost all instances the excitement attendant upon a large run of fish leads to extra exertion on the part of the fishermen, and consequent overfishing, leaving too few parent fish to reach their spawning-ground. The practice in some towns of annually selling at auction the right to take these fish to parties whose interest terminates with the season, is one of doubtful policy.

SHAD (*Alosa præstabilis*).

Shad-hatching on the Merrimac was carried on by Mr. A. C. Hardy, who gives the following report:—

| DATE. | Shad taken. | Males. | Females. | Air at 6 A. M. | Water at 6 A. M. | Weather. | No. of Fish taken at each Sweep. | Spawn taken. | Time of Hauling Seine. |
|--------------|-------------|--------|----------|----------------|------------------|----------|----------------------------------|--------------|----------------------------------|
| 1875. | | | | | | | | | |
| June 11, | 35 | 26 | 9 | 65 | 64 | Clear, | 0, 1, 2, 9, 10, 13, | 50,000 | 10, 11, A. M.; 2, 4, 7, 9, P. M. |
| 12, | 44 | 28 | 16 | 66 | 65 | Clear, | 0, 7, 8, 11, 13, 5, | 150,000 | 4, 5, 6, 8, 9, 10, P. M. |
| 13, | 37 | 22 | 15 | P. M. 54 | P. M. 66 | Clear, | 5, 11, 14, 7, | 250,000 | 8, 9, 10, 11, P. M. |
| 14, | 41 | 30 | 11 | A. M. 67 | A. M. 64 | Cloudy, | 8, 13, 10, 7, 2, | 175,000 | 7, 8, 9, 10, 11, P. M. |
| 15, | 48 | 39 | 9 | 56 | 66 | Clear, | 0, 2, 4, 25, 12, 5, | 75,000 | 4, 6, 7, 8½, 10, 11½, P. M. |
| 16, | 44 | 29 | 15 | 65 | 66 | Clear, | 0, 4, 17, 18, 5, | 200,000 | 4, 6, 7½, 9, 11, P. M. |
| 17, | 31 | 23 | 8 | 82 | 74 | Clear, | 11, 11, 9, | 75,000 | 8, 9, 10, P. M. |
| 18, | 50 | 27 | 23 | P. M. 47 | P. M. 65 | Storm, | 8, 13, 20, 9, | 500,000 | 6, 7½, 9, 10, P. M. |
| 20, | 20 | 15 | 5 | 57 | 62 | Clear, | 3, 5, 7, 5, | 15,000 | 6, 7, 9, 10½, P. M. |
| 21, | 48 | 44 | 4 | 68 | 64 | Clear, | 6, 9, 16, 12, 5, | — | 3, 4, 6, 7½, 9, P. M. |
| 22, | 113 | 87 | 26 | 72 | 66 | Clear, | 16, 17, 13, 12, 15, 6, | 50,000 | 1, 2, 3, 5, 7, 9, P. M. |
| 23, | 110 | 85 | 25 | 71 | 67 | Clear, | 15, 16, 13, 11, 15, 6, | 40,000 | 1, 2, 3, 5, 7, 9, P. M. |

| DATE. | Shad taken. | Males. | Females. | Air at 6 A. M. | Water at 6 A. M. | Weather. | No. of Fish taken at each Sweep. | Spawn taken. | Time of Hauling Seine. |
|----------|-------------|--------|----------|----------------|------------------|------------------------------|----------------------------------|--------------|--|
| June 24, | 108 | 75 | 33 | 70 | 68 | Clear, | 4, 6, 8, 15, 18, 19, 17, 11, 10, | 300,000 | { 10, 10½, 11½, A. M.; 2, 3, 5, 7, 8, 9½, P. M. |
| 25, | 36 | 15 | 21 | 74 | 71 | Clear, | 7, 10, 11, 8, | 200,000 | 7½, 8½, 9½, 10½, P. M. |
| 26, | 40 | 23 | 17 | 72 | 73 | { Cloudy, with some rain, | 5, 11, 15, 9, | 200,000 | 7, 8, 9, 10, P. M. |
| 27, | 42 | 19 | 23 | 75 | 72 | Clear, | 0, 4, 15, 12, 3, 8, | 250,000 | 4, 5, 7½, 8½, 10, 11, P. M. |
| 28, | 31 | 20 | 11 | 65 | 70 | Clear, | 5, 11, 8, 7, . | 100,000 | 8, 9, 10½, 11½, P. M. |
| 29, | 30 | 21 | 9 | 68 | 71 | Cloudy, | 4, 13, 8, 5, . | 125,000 | 7½, 8½, 9½, 10½, P. M. |
| 30, | 73 | 36 | 37 | 68 | 73 | Clear, | 2, 40, 17, 9, 5, . | 500,000 | 7, 8, 9, 10, 11, P. M. |
| July 1, | 72 | 32 | 40 | 65 | 70 | Clear, | 1, 34, 30, 7, . | 550,000 | 7½, 9, 10½, 11, P. M. |
| 2, | 47 | 32 | 15 | 67 | 71 | Clear, | 6, 13, 23, 5, . | 150,000 | 7, 8, 9½, 10½, P. M. |
| 3, | 30 | 22 | 8 | 68 | 72 | Clear, | 9, 10, 7, 4, . | 150,000 | 8, 9, 10, 11½, P. M. |
| 4, | 33 | 20 | 13 | 66 | 71 | Cloudy, | 3, 9, 14, 7, . | 200,000 | 7½, 9, 10, 11, P. M. |
| 5, | 15 | 9 | 6 | 69 | 72 | Thundersh'w'rs, | 4, 9, 2, . | 75,000 | 7, 8, 9, P. M. |
| 6, | 38 | 25 | 15 | 78 | 72 | Thundershow'r, | 4, 15, 12, 7, . | 350,000 | 7½, 8½, 9½, 10½, P. M. |
| 7, | 40 | 21 | 19 | 76 | 74 | Clear, | 9, 11, 13, 7, . | 400,000 | 8, 9, 10½, 11½, P. M. |

| | | | | | | | | | | | | | | |
|---------|----|----|----|----|----|---------|---|---|---------------|---|---|---|---------|---|
| July 8, | 26 | 9 | 17 | 68 | 74 | Clear, | . | . | 4, 15, 7, | . | . | . | 250,000 | 8, 9, 10, P. M. |
| 9, | 17 | 8 | 9 | 72 | 73 | Cloudy, | . | . | 3, 9, 5, | . | . | . | 150,000 | 8, 9, 10, P. M. |
| 10, | 21 | 12 | 9 | 75 | 74 | Cloudy, | . | . | 7, 9, 5, | . | . | . | 150,000 | 8, 9, 10, P. M. |
| 11, | 33 | 14 | 19 | 70 | 73 | Clear, | . | . | 2, 11, 13, 7, | . | . | . | 350,000 | 8, 9, 10, 11, P. M. |
| 12, | 19 | 10 | 9 | 71 | 74 | Clear, | . | . | 1, 6, 8, 4, | . | . | . | 125,000 | 8, 9, 10, 11, P. M. |
| 13, | 19 | 7 | 12 | 71 | 74 | Clear, | . | . | 2, 7, 5, 5, | . | . | . | 200,000 | 8, 9, 10, 11, P. M. |
| 14, | 17 | 9 | 8 | 70 | 74 | Clear, | . | . | 4, 7, 3, 3, | . | . | . | 125,000 | 8 $\frac{1}{2}$, 9 $\frac{1}{2}$, 10 $\frac{1}{2}$, 11 $\frac{1}{2}$, P. M. |
| 15, | 15 | 8 | 7 | 78 | 74 | Clear, | . | . | 4, 5, 5, 1, | . | . | . | 75,000 | 8, 9, 10, 11, P. M. |
| 16, | 14 | 8 | 6 | 62 | 73 | Cloudy, | . | . | 1, 6, 4, 3, | . | . | . | 50,000 | 8, 9, 10, 11, P. M. |
| 17, | 11 | 6 | 5 | 61 | 73 | Clear, | . | . | 4, 5, 2, | . | . | . | 30,000 | 8 $\frac{1}{2}$, 9 $\frac{1}{2}$, 10 $\frac{1}{2}$, P. M. |
| 18, | 9 | 5 | 4 | 60 | 73 | Clear, | . | . | 4, 3, 2, | . | . | . | 25,000 | 8, 9, 10, P. M. |
| 19, | 6 | 4 | 2 | 65 | 74 | Clear, | . | . | 1, 3, 2, | . | . | . | 10,000 | 8, 9, 10, P. M. |

| | | |
|-------------------------------------|---------|-----------|
| Total number of shad taken, | | 1,433 |
| Total amount of spawn, | | 6,670,000 |
| Hatched and turned in above Lowell, | | 825,000 |

Delivered to Mr. Estey for Neponset River (number not stated) ; the balance turned in at North Andover.

The establishment at this place during the past season appears not to have been carried on with the usual care. Orders were given Mr. Hardy to have all the spawn and young fish not required elsewhere carried above the Lawrence dam, while the report shows that less than one-sixth of the whole number taken were thus deposited.

We have stated heretofore that the spawning-ground below the dam was so limited that very little could be hoped for from natural breeding, and had not the river been closed and artificial hatching resorted to, the fishing for shad would in a short time have come to an end. At the time the river was closed more than two-thirds of the seining-grounds had been abandoned, and those remaining were of little value. The Act closing the river did not prevent fishing, for many of the fishermen were not disposed to comply with any regulations, and, in their testimony before the legislative committee, stated that they considered the fishway at Lawrence a failure—it could never be made effective ; that hatching of shad did not amount to anything ; and that they ought to have the right to catch what fish they could while they lasted. Most of these men have seined on the Merrimac more or less for the last forty years, are generally very good citizens, honest and intelligent upon most subjects, having no liking for what they consider “new-fangled notions” about fish, and strongly imbued with the idea that all fish allowed to pass their seines will be caught by their neighbors above. In some respects they differ widely from the fishermen on the Connecticut, who have wisely come to the conclusion that their interest consists in maintaining the laws and encouraging the State in its efforts to restock the river.

The increase in the Hudson and Connecticut appears to correspond with the number of shad artificially hatched.

In 1871 and 1872 nearly eight million young shad were turned into the Merrimac, the result of which should have

been realized this year, and from the best information obtained the catch this season appears to have been the largest within twenty-five years. The shad were reported to have been so plenty at Newburyport that they were salted and barrelled as in olden times.

Whether this increase has in any way changed the views of the fishermen, we are unable to say. Perhaps it would be well, in order to demonstrate more fully the advantages to be gained from artificial hatching, to discontinue for a while the establishment at North Andover.

An abundance of young shad for restocking other rivers can be obtained from the hatching-grounds at South Hadley. Shad-hatching at this place was carried on during a part of last season by Prof. Baird, under the superintendence of James W. Milner, Assistant United States Commissioner. Mr. Milner's report in full has not yet been received, but the following letter will show the number of young fish hatched, and the distribution of the same :—

UNITED STATES COMMISSION, FISH AND FISHERIES, }
WAUKEGAN, ILL., NOV. 30, 1875. }

DEAR MR. BRACKETT :—Your letter asking for the statement of shad-hatching operations on the Connecticut River has been sent to me by Prof. Baird to answer.

My records afford the following figures of the disposition of the young fishes :—

| | | |
|--|------------------------------|-----------|
| Connecticut River above dam, from Smith's Ferry to | | |
| | South Vernon, Vt., | 1,205,000 |
| " | " at Fishery, | 580,000 |
| Total, | | 1,785,000 |
| Streams in New England other than Connecticut River, | | 320,000 |
| Started for Germany, | | 400,000 |
| Rivers in United States other than New England, . | | 530,000 |
| Total from Connecticut River, | | 3,035,000 |

In accordance with our standards of estimation I think these figures are nearly correct.

Yours truly,

JAMES W. MILNER.

The reports from the shad-fisheries along the Connecticut have been very encouraging. In answer to inquiries made of Dr. Wm. M. Hudson, Commissioner on Fisheries for the State of Connecticut, the following interesting letter was received :—

STATE OF CONNECTICUT.

DEPARTMENT OF FISHERIES,
HARTFORD, CONN., Dec. 2, 1875. }

MY DEAR BRACKETT :—Your letter of the 29th ult., asking for information as to the catch of shad in the Connecticut River during the last season, and also of the passage of fish over the fishway at the Greenville dam of the Norwich Water Power Co. is received. I cannot give you details of the fisheries on the river, but may say in general that the shad were numerous, of large size, and excellent quality. Col. Joseph Selden, the owner of one of the most extensive seine fisheries, located at Middle Haddam, testified that at his place more shad were taken last season than in any one year during the last forty, and this statement was made from actual records. The river fishing was so good that none of the fishermen made any opposition to the reestablishment of the pounds near the mouth of the river.

With regard to the Brackett fishway over the Greenville dam, President Smith wrote me that nearly all the varieties of fish frequenting the river had been seen passing through it, except shad, and there were rumors of shad having been seen above the dam. The superintendent of the fishway informed me that he had seen large numbers of alewives passing up, and upon shutting off the water, had found in the bays trout, black bass and eels. He did not at any time find any shad in the fishway. Sect. 5 of a law passed at the last session of our legislature, provides as follows :—

“It shall be the duty of the fish commissioners, to furnish each owner or proprietor of any pound, weir, or similar fixed contrivance, pier, seine, drag or gill-net, on or before the fifteenth day of March in each year with suitable blank forms for the reports of catch, required by section three, so arranged that the catch of each day of fishing may be separately recorded thereon; and in filling out such reports, such owner or owners shall give the results of each day's fishing, as far as practicable, and it shall be the duty of such owner or proprietor to apply to the fish commissioners for such blank forms.”

How nearly this will accomplish the purpose for which it is designed, the future will determine.

Yours very truly,

WM. M. HUDSON.

The Act quoted by Dr. Hudson, which passed the Connecticut legislature last summer, is similar to the suggestion made in our report last year, and to which we again call attention.

“We recommend the passage of a law requiring all persons using seines, nets, or traps of any kind, for the taking of fish in the waters under the jurisdiction of the Commonwealth, to report to the Commissioners on Inland Fisheries, on or before the first day of September of each year, the number and variety so taken, and the market value of the same. To such a law, we think, there would be no serious objection, as many of the fishermen have expressed themselves in favor of some regulation of this kind. The statistics thus obtained would be of great value to the State, as showing the magnitude of the fishing interests and the rapid increase that is everywhere following a more intelligent system of culture.”

That the legislature has an undoubted right to regulate the fisheries has long been settled by the courts; and while the State is extending its fostering care over them, there ought not to be any objection on the part of the fishermen to comply with so simple a requirement. As the case now stands, it is exceedingly difficult to obtain information, or any reliable data, by which the products of one year can be compared with another. People may differ widely in regard to the opinions expressed in these reports, but upon the accumulation of well-attested facts, no such difference is likely to arise.

The following statement from the Scientific Department of “Harper’s Weekly” is important as showing the amount of fish, especially shad and herring, that yearly find their way to the Washington markets:—

“The annual table of the inspection of fish in the Washington City Market has just been presented to the Board of Health by Mr. C. Ludington, Inspector of Marine Products. From this we learn that the number of shad inspected amounted to 464,215; of tailors (a species of shad), to 56,430; and of herring, to 1,674,465. The number of ‘bunches of fish’ sold was 557,203; of sturgeon, 1,240; the whole of which, reduced to pounds, is equivalent to 7,002,049. Of oysters there were 305,737 bushels; of clams, 1,110,725; of crabs, 446,525.

“ This table, as compared with that of 1874, exhibits some notable differences. Of shad scarcely more than two-thirds as many were marketed as in 1874, and about one-half of the number in 1873. Herring showed a still greater diminution, the yield in 1874 having been 6,567,240. The ‘ bunches of fish ’ were about the same. On the other hand, the yield of sturgeon was much greater, being nearly three times that of 1873, and thirty per cent. more than that of 1874.

“ The total yield of fish, in pounds, in 1873 was 8,548,851 ; in 1874 it was 10,827,967, that of 1875 being a very noticeable diminution from the yield of the previous year. Of oysters and clams a considerable less number was marketed in 1875, but a large number of crabs.

“ Some idea of the importance of a careful inspection of the fish in the market may be learned from the fact that the value of the fish condemned as unfit for food in 1875 amounted to over \$7,000 ; in 1874, to over \$10,000.

“ It may be remarked that by far the greater portion of the fish sold in the Washington Market is derived from the Potomac River and Chesapeake Bay, as may also be said of the oysters, clams and crabs. The inferiority in the number of shad and herring taken in 1875 is supposed to have been due to the continued cold weather during the spring, which prevented the rivers from attaining a temperature such as would invite the expectant fish to enter their mouths from the sea. The yield in the Delaware, the Hudson and the Connecticut was larger than usual, thus explaining what became of the difference.”

The reasons given for the decrease of shad and herring (alewives) during the past season, and the corresponding increase of these fish in eastern waters, would have been more complete had the same cause been assigned for the scarcity of clams and oysters, for these mollusks would be perhaps as likely to leave the Chesapeake Bay in consequence of the late spring and go up the Hudson and Connecticut as would the shad and herring belonging to the Potomac.

TROUT (*Salmo fontinalis*).

In the artificial cultivation of trout, the tendency in many establishments is to depart too much from the natural requirements ; forgetting that true culture consists in assist-

ing and developing nature, and that all efforts made in any other direction must sooner or later end in disappointment.

It is very doubtful whether a stream of water flowing through a given space can by being dammed and flowed into a large pond, be made to produce more trout than it would if left to its natural course. The flowing of the pond would undoubtedly largely increase the supply of food, but it would also raise the temperature of the water and decrease the amount of oxygen necessary to sustain life. Exposed to the direct rays of the sun in our hot summer weather, there is danger of these ponds becoming so warm as to render them unfit for the object for which they were intended. If the trout are not killed outright, they become diseased, unfit for the table, and useless for the purpose of propagation. Water absorbs oxygen in proportion to the lowness of temperature. If it is above 70° the fish sicken and die. A few of the weak ones give out first, and where there are large numbers huddled together, the death-rate increases rapidly. It is useless to look for some twenty or thirty diseases with which trout are said to be affected; the great loss of young fish in the hatching-houses or troughs is due almost entirely to the lack of oxygen and a superabundance of carbon in the water. Those who are familiar with these things will remember that in the beginning of the mortality, a few fish will be found swimming on the surface, gasping as if choked, and in a short time will be found dead. An examination of them, whether ten or ten thousand, shows that they have all died of the same disease. The mouth is stretched as wide open as possible, the tails and lower part of the fish bent backward, and more or less of white mould will be found in the gills;—even before death ensues this mould is visible to the naked eye. If they are taken out as soon as the first symptoms appear, and put into a rapid stream, they will generally recover. In water suitable for raising young trout the growth of fungi on any living organism is hardly possible except where injuries have been sustained. The fact that any one, at will, can produce these effects, either by lessening the amount of water required or by allowing it to become too warm, points clearly

to the remedy. The flowing of a pond at the foot of the stream would be valuable for winter quarters and for the trout to retreat into during the cool days of spring and autumn. All efforts at raising trout have, thus far, been confined to artificial ponds, and most of the failures can be traced directly to the evil of spreading a small stream over too large a surface. There is an easier, more natural, and perhaps more profitable way of raising trout, which has not yet been tried by many of the growers;—its simplicity and cheapness bring it within easy control of any one owning in whole or part, a trout stream in which is any considerable fall. At the foot of the stream, or where the owner's right terminates, should be constructed a dam sufficient to insure a depth of not less than six feet of water, and the overflow carefully screened;—above this a number of small dams should be made, the distance between them being determined by the fall of the stream; not being so near as to flow back upon each other, but far enough apart to allow a portion of the stream to remain unchanged. Nor should they be so high as to materially change the temperature of the water. Small fishways or shutes should be built over these dams to enable the fish to pass and repass.

Around the dams, right and left, trenches should be made for the purpose of raising young fish and conducting the overflow in times of freshets. The trenches for the young fish should be gated so as to give, at all times, an even flow of water. It is desirable that the water falling over the dams should be broken and aerated as much as possible. At the head of one of the trenches may be built a small hatching-house,—or wooden troughs with covers could be used instead of the house. The south sides of the ponds and the stream, if it is open to the rays of the sun, should be planted with willows, and portions of the stream covered with plank or slabs for the fish to hide under. During spawning season the fishways may be screened, the fish caught and stripped, and the eggs impregnated by the dry method.

If the eggs are not ripe when the trout are caught, the fish may be deposited in one of the trenches and handled at pleasure. The cost of such an arrangement on many of our

brooks would not exceed that of fencing an acre of land, while the products would depend upon its *length*, the quantity of water at the lowest point and the amount of artificial food given. Those who are familiar with the great number of trout still to be found in some of the brooks of Maine and New Brunswick, can form some idea of what might be done with many of our own streams. Overfishing, and the cutting off the woods opening the water to the direct rays of the sun, has depopulated almost every trout stream in the State.

SALMON (*Salmo salar*).

About two hundred and fifty thousand young salmon were hatched from the spawn received by the State from the Bucksport establishment last spring. By an agreement made by Mr. Noyes, chairman of the New Hampshire commission, these were to be taken by that Board and distributed in the headwaters of the Merrimac. Accordingly, Commissioner John S. Wadleigh, of Laconia, commenced work about the first of June, and as he was entirely inexperienced in moving young fish, a man long connected with fish-culture was employed to assist him. The work of moving occupied nearly two weeks,—Mr. Wadleigh making the entire trip to Plymouth, N. H., and back the same day. From his statement it appears that in the first, second, and third lots of fish, there was needless loss; that either his assistant did not *know* or did not attend to his work. Finding that matters were growing worse rather than better, we gave Mr. Wadleigh careful directions, and requested him to assume the responsibility. Hitherto, as a matter of precaution, the cans had been loaded lightly, that the parties might feel their way; on the fourth trip a much larger number were put into the cans, and Mr. W. started with them for Plymouth. On his return he stated that, on turning them into the river, there were not over a dozen dead fish out of the twenty-five thousand, and this he thinks was a fair sample of the remainder of the fish taken up.

The following is his report:—

LACONIA, BELKNAP COUNTY, N. H., Dec. 27th, 1875.

E. A. BRACKETT, Esq., *Fish Commissioner of Massachusetts.*

DEAR SIR:—In answer to the several interrogatories addressed to the commissioners of New Hampshire, I reply,—

1. The waters of the Merrimac River were stocked with the salmon hatched from the Penobscot eggs.

2. The young fish were set free in the Pemigewasset river, the main branch of the Merrimac River, from two to six miles above Livermore's Falls, or, in other words, from four to ten miles above Plymouth, at various points within those limits.

3. Their number was, by estimation, about 230,000. The remainder of the fish were received by Mr. Noyes, who has made a statement to you in regard to them.

I will add for your information that, being without experience in handling fish, I secured the services of a gentleman accustomed thereto, and acted under his direction and with his assistance; but, with all possible care, a large per cent. was lost in the transmission of the first three lots, which were made in the ordinary and usual manner. At the time when this took place, the weather was very warm, it being about the middle of June, and I was dissatisfied with the results; and, although all the common expedients had been used to insure safety, I became convinced something more was needed to warrant success. I became convinced that the loss was occasioned by the varying temperature of the water in which they were conveyed. In the subsequent trips, the precaution was taken to ascertain the temperature of the water in the hatching-house at the time the fish were removed from it, and, by the aid of a thermometer during transmission, kept the water in the cars at the same temperature; and the result was *absolute success*.

It was estimated that I took about 30,000 at each trip, and I thought I lost nearly or quite 15 per cent. of the first three lots.

Respectfully yours,

J. S. WADLEIGH.

Young salmon are reported very plenty in the upper waters of the Merrimac, and more or less continue to be caught in the mackerel seines in Massachusetts Bay and forwarded to Boston and New York markets. A large number of salmon spawn will be received in January from Bucksport, and still more may be expected in October from California.

Land-locked or Fresh-Water Salmon.

The endeavors of this State, in conjunction with the United States Commission and the Commission of Connecticut, have hitherto been unfortunate in obtaining spawn of this valuable fish. Relying upon information which they had every reason to believe correct, a hatching-house was established at the head of Sebec lake, and a man, supposed to be fully competent, employed to take charge of it. Three years' experience demonstrated that the requisite number of spawning fish could not be obtained at that place, and, last spring, a change was made to Grand Lake Stream, and the whole matter put under the charge of the able superintendent of the Bucksport Salmon Works, Mr. Charles G. Atkins, who, in his report of December 1, states that he has succeeded in obtaining nine hundred thousand fresh-water salmon spawn. Should no accident happen to these eggs, the portion coming to this State will be sufficient to supply the demand.

We have asked for the control of one or more ponds in which a portion of these fish can be placed, so that in time we may not be obliged to go out of the State for their spawn.

Those who control ponds by lease or otherwise (it would be almost useless to put them into any others, as they would be caught out before they are large enough to breed) should in their application state the quality of the water, size of pond, whether the bottom is rocky, sandy or muddy, the character of the inlet and outlet, and the kind of fish now in it. The young salmon will be delivered free at the hatching-house at Winchester, and those who receive them must provide a competent person to take charge of them during transportation, for these fish are too valuable to be lost, either through carelessness or ignorance. The ten thousand hatched last spring were distributed to the towns of Sandwich, Pittsfield, Ashburnham and Winchester. No loss occurred in transit.

California Salmon (Salmo quinnat).

Eighty thousand spawn of these fish were presented to this State by Prof. Baird, United States Commissioner, and were received at the hatching-house in Winchester, last October,

in excellent condition. Something over seventy-five thousand of them hatched, producing very healthy young fish, which will be ready to distribute to other waters about the first of January. The activity, rapid growth and capability of these salmon to endure the extremes of heat and cold make them available for rivers and streams where Atlantic salmon would not thrive. It is desirable to stock some of our waters with them, and it may be necessary, in consequence of the change of temperature produced by cutting away the forests, to introduce them into all the rivers where salmon formerly existed.

The following information concerning these fish is taken from the report of the California commissioners :—

“ Much attention is given to the Sacramento salmon (*Salmo quinnat*) by scientists and by fish culturists in other countries, for the reason that it comes into rivers to spawn in latitudes much lower and in waters much warmer than any other variety yet known. Large numbers pass up the San Joaquin River for the purpose of spawning in July and August, swimming for one hundred and fifty miles through the hottest valley in the State, where the temperature of the air at noon is rarely less than 80° Fahrenheit, and where the average temperature of the river, at the bottom, is 79°, and at the surface, 80°. The salmon of the San Joaquin River appear to be of the same variety as those in the Sacramento, but average smaller in size. Their passage to their spawning-grounds at this season of the year, at so high a temperature of both air and water, would indicate that they will thrive in all the rivers of the Southern States, whose waters take their rise in the mountainous regions; and in a few years, without doubt, the San Joaquin salmon will be transplanted to all of those States.

“ The weight of salmon caught during the past season in the waters of the Sacramento and San Joaquin rivers is estimated at 5,098,780 pounds, in addition to 92,000 pounds of fresh salmon shipped in ice to the New York market.”

“ *Distribution of California Ova.*

“ The following table shows the condition in which the California salmon eggs are reported to have arrived at their destinations :—

| NAME OF STATE. | Number of Eggs. | Condition. |
|-------------------------------|-----------------|--|
| Massachusetts, | 80,000 | Good. |
| Connecticut, | 480,000 | Splendid; very few dead eggs. |
| Rhode Island, | 240,000 | Not good |
| New York, | 80,000 | Not heard from. |
| New Jersey, | 320,000 | Apparently very nice. |
| Pennsylvania, | 480,000 | Remarkable success; one per cent. lost. |
| Maryland, | 560,000 | Beautiful condition; couldn't be better. |
| Virginia, | 320,000 | Fine order. |
| Michigan, | 800,000 | Very little loss; eggs superior. |
| Illinois, | 80,000 | Excellent; not over two per cent loss. |
| Wisconsin, | 80,000 | Splendid order. |
| Minnesota, | 400,000 | Excellent; fine condition. |
| Iowa, | 300,000 | Fine condition. |
| Colorado, | 240,000 | Good order. |
| Utah, | 160,000 | Two per cent. loss. |
| Canada, | 80,000 | Very good. |
| New Zealand, | 50,000 | Not heard from. |
| Northville, Mich., for U. S., | 1,000,000 | Good; four per cent. loss. |
| Kern River, Cal., . . . | 250,000 | First-rate. |
| Truckee River, Cal., . . | 250,000 | First-rate. |

“The thermometer averaged 95° in the shade on the days these eggs were packed. They were loaded into wagons at noon, and were eleven hours on the road before reaching a railway station, after which they were conveyed by rail over three thousand miles. The only lot that arrived in poor condition was the Rhode Island consignment, and this is accounted for by their being three days on their way from New York to Providence. The same thing happened last year through the unaccountable and unpardonable negligence of the express agents between New York City and Providence. After deducting losses for transportation, it will be seen that about five million (5,000,000) living young salmon reached the Atlantic States, besides two million (2,000,000) which were successfully hatched and placed in California waters, making a complete total of seven million (7,000,000) salmon added to the stock of salmon in American waters from the McCloud fishery this year.”

North River.

By Resolve of the legislature, passed April 15, 1875, the Commissioners were required “to make a full investigation into the condition of the fisheries on North River, in Plymouth County, and its tributaries, and to recommend what

legislation, if any, is necessary, concerning the same, to the next general court."

Formerly, shad and alewives abounded in this river. Of these the shad have become almost extinct; and although alewives still annually ascend the stream in considerable numbers, they have ceased to be of any special pecuniary benefit to the bordering towns.

The upper towns particularly complain that their supply of fish is almost wholly cut off by reason of the indiscriminate and unlawful fishing carried on below.

Certain it is that this subject is a prolific source of contention, which, in the present posture of affairs, seems likely to be renewed at every session of the legislature.

A proposition by the Commissioners to stock the river with salmon, and to close it for a term of years against all fishing, was favorably received, and, if carried out, would, we are confident, give entire satisfaction.

No river in the Commonwealth is better adapted to become a good shad and salmon stream; and the value of such a fishery would greatly exceed that of any supply of alewives, however abundant.

With this view, we recommend the passage of an Act prohibiting fishing in North River for the term of five years; and in the hope that the legislature will adopt this recommendation, we have already placed in the river 25,000 California salmon, to which we propose to add an equal or larger number annually until it is thoroughly stocked. The supply of shad already in the river will be sufficient to stock it with that species of fish, if allowed to propagate undisturbed for the period named.

In the Appendix (C) will be found a "Sketch of the Progress of Fish-Culture in New England," by Theodore Lyman.

The interest in fish-culture, not only in this State, but throughout almost the entire civilized world, is increasing, perhaps, quite as fast as is consistent with a healthy growth. No important industry is built up in a day. It is ever the result of time, of a wide-spread intelligence, a clear sense of its requirements, and an earnest disposition to comply with the laws necessary to its success. In this country, the vitality

of any public enterprise is more closely interwoven with popular sentiment than elsewhere. So long as many of the mill-owners felt that they were backed by indifference on the part of the people, and lawless fishermen violated law without creating a general sense of wrong, but little could be hoped from individual efforts, however well directed. A very marked change has taken place within a few years. Mill-owners, with rare exceptions, now show a commendable spirit, and in several instances, have voluntarily applied to the Commissioners for plans of fishways to be built over their dams, and fishermen are more generally disposed to regard violation of laws protecting fish as detrimental to their best interest, while the apathy and skepticism, so marked in the beginning,—broken only by occasional opposition, from selfish motives,—is fast giving way to a more positive and healthy state of feeling. By the Act of 1869, fish were made property, since which a large number of our ponds have been leased and stocked.

Considering the disorderly element that exists in all communities, and the right claimed by many to fish when and where they please, it is remarkable that so few depredations have been committed, and the rights of lessees so generally regarded. Quite a number of these ponds have been leased to the towns where they are located. In the Appendix will be found the annual report from some of these leases which are, in themselves, evidence of the growing interest in fish-culture.

For the necessary expenses of the Commission, and the continuance of the hatching and distribution of fish, we recommend an appropriation of five thousand dollars; for the completion of the Lawrence fishway, and improvements at the foot of the Holyoke fishway, the sum of three thousand dollars.

THEODORE LYMAN,
E. A. BRACKETT,
ASA FRENCH.

Commissioners on Inland Fisheries.

EXPENDITURES OF COMMISSION.

| | |
|--------------------------------|------------|
| Salary, | \$1,650 00 |
| Travelling expenses, | 338 14 |

GENERAL EXPENSES.

| | | |
|---|----------|----------------|
| Subscription to land-locked salmon enterprise, Grand Lake Stream, Me., | \$500 00 | |
| Subscription to Penobscot salmon-breeding, | 500 00 | |
| Labor and material on account of Holyoke fish- way, | 264 80 | |
| Care of sundry fishways, | 114 30 | |
| Transportation of fish, spawn, etc., | 31 25 | |
| Cans, piping, etc., | 36 88 | |
| Rent of land for hatching-house, Winchester, | 50 00 | |
| Printing blanks, circulars, etc., | 45 45 | |
| Hatching shad at North Andover, | 520 91 | |
| Screens, etc., | 143 49 | |
| Reporter's services, | 11 60 | |
| Coal and cement, | 5 00 | |
| | | <hr/> 2,224 68 |

IMPROVING LAWRENCE FISHWAY.

| | | |
|----------------------------------|------------|------------|
| Labor and material, | \$1,831 56 | |
| Rendrock, fuses, etc., | 16 72 | 1,848 28 |
| | | <hr/> |
| Total to December 15, | | \$6,061 10 |

A P P E N D I X.

APPENDIX

[A.]

COMMISSIONERS ON FISHERIES.

UNITED STATES.

| | |
|-----------------------------------|---|
| Prof. SPENCER F. BAIRD, | { Smithsonian Institution, Washington, D. C. |
|-----------------------------------|---|

MAINE.

| | |
|-----------------------------|-----------|
| E. M. STILWELL, | Bangor. |
| HENRY O. STANLEY, | Dixfield. |

NEW HAMPSHIRE.

| | |
|-----------------------------|-----------|
| OLIVER H. NOYES, | Henniker. |
| JOHN S. WADLEIGH, | Laconia. |
| A. C. FIFIELD, | Enfield. |

VERMONT.

| | |
|--------------------------|----------|
| M. C. EDMUNDS, | Weston. |
| M. GOLDSMITH, | Rutland. |

MASSACHUSETTS.

| | |
|---------------------------|------------------|
| THEODORE LYMAN, | Brookline. |
| E. A. BRACKETT, | Winchester. |
| ASA FRENCH, | South Braintree. |

CONNECTICUT.

| | |
|------------------------------|-------------|
| WILLIAM M. HUDSON, | Hartford. |
| ROBERT G. PIKE, | Middletown. |
| JAMES A. BILL, | Lyme. |

RHODE ISLAND.

| | |
|--------------------------------|-------------|
| NEWTON DEXTER, | Providence. |
| ALFRED A. REED, Jr., | Providence. |
| JOHN H. BARDEN, | Scituate. |

NEW YORK.

| | |
|--------------------------------|----------------|
| HORATIO SEYMOUR, | Utica. |
| ROBERT R. ROOSEVELT, | New York City. |
| EDWARD M. SMITH, | Rochester. |

- 1871.—Nov. 1. Punkapoag Pond, in Randolph and Canton, to Henry L. Pierce, 20 years.
- 1872.—Jan. 1. Sandy Pond, Forest Lake, or Flint's Pond, in Lincoln, to James L. Chapin and others, 20 years.
- Apr. 1. Onota Lake, in Pittsfield, to William H. Murray and others, 5 years.
- July 20. Little Pond, in Braintree, to Eben Denton and others, 20 years.
- 1873.—May 1. Meeting-house Pond, in Westminster, to Inhabitants of Westminster, 15 years.
1. Great Pond, in Weymouth, to James L. Bates and others, 15 years.
- July 1. Little Sandy Pond, in Pembroke, to A. C. Brigham and others, 16 years.
- Sept. 1. Pontoosuc Lake, in Pittsfield and Lanesborough, to E. H. Kellogg and others, 15 years.
- Oct. 1. Farm Pond, in Sherborn, to Inhabitants of Sherborn, 15 years.
1. Spot Pond, in Stoneham, to Inhabitants of Stoneham, 15 years.
- Nov. 1. Lake Chaubunagungamong, or Big Pond, in Webster, to Inhabitants of Webster, 5 years.
- Dec. 1. Lake Wauban, in Needham, to Hollis Hunnewell, 20 years.
- 1874.—Mar. 1. Walden and White Ponds, in Concord, to Inhabitants of Concord, 15 years.
2. Upper Nankeag, in Ashburnham, to Inhabitants of Ashburnham, 20 years.
- Apr. 1. Elder's Pond, in Lakeville, to Inhabitants of Lakeville, 15 years.
20. North and South Podunk ponds, in Brookfield, to Inhabitants of Brookfield, 15 years.
- May 2. Brown's Pond, in Peabody, to John L. Shorey, 15 years.
1. Maquan Pond, in Hanson, to the Inhabitants of Hanson, 15 years.
16. Wickaboag Pond, in West Brookfield, to Lemuel Fullam, 15 years.
20. Unchechewalom and Massapog ponds, to the Inhabitants of Lunenburg, 20 years.
- July 1. Hardy's Pond, in Waltham, to H. E. Priest and others, 15 years,

- 1874.—July 1. Hockomocko Pond, in Westborough, to L. N. Fairbanks and others, 15 years.
11. Mitchell's Pond, in Boxford, to R. M. Cross and others, 15 years.
11. Hazzard's Pond, in Russell, to N. D. Parks and others, 20 years.
Oct. 1. East Waushacum Pond, in Sterling, to Inhabitants of Sterling, 20 years.
20. Middleton Pond, in Middleton, to Inhabitants of Middleton, 15 years.
- 1875.—Jan. 1. White and Goose ponds, in Chatham, to George W. Davis, 15 years.
Mar. 1. Lake Pleasant, in Montague, to Inhabitants of Montague, 10 years.
1. Hood's Pond, in Ipswich and Topsfield, to Inhabitants of Topsfield, 15 years.
Apr. 1. Chauncey Pond, in Westborough, to Inhabitants of Westborough, 15 years.
3. West's Pond, in Bolton, to J. D. Hurlburt and others, 15 years.
15. Gates Pond, in Berlin, to E. H. Hartshorn and others, 15 years.
May 1. Morse's Pond, in Needham, to Edmund M. Wood, 15 years.
1. Great Pond, in North Andover, to Eben Sutton and others, 20 years.
1. Chilmark Pond, in Chilmark, to J. Nickerson and others, agents, 20 years.
July 1. Winter Pond and Wedge Pond, in Winchester, to Inhabitants of Winchester, 15 years.
1. Haggett's Pond, in Andover, to Inhabitants of Andover, 20 years.
Aug. 1. Oyster Pond, in Edgartown, to J. H. Smith and others, 20 years.
7. West Waushacum Pond, in Sterling, to Inhabitants of Sterling, 20 years.
9. Mystic (Upper) Pond, in Winchester, Medford and Arlington, to Inhabitants of Winchester and Medford, 15 years.
Oct. 1. Little Chauncey and Solomon ponds, in Northborough, to Inhabitants of Northborough, 15 years.

WEST TISBURY, Oct. 18, 1875.

To the Commissioners on Inland Fisheries.

GENTLEMEN :—The lessees of the Tisbury Great Pond submit their fifth annual report :—

| | |
|--|------------|
| Net proceeds of the fisheries, | \$1,015 31 |
| Town's part, | 50 77 |

This amount was mostly for herring, which were very plenty.

There were no perch removed from the pond during the year ; the lessees thought it better to let them spawn one year, although they are quite numerous.

Last spring, while seining for herring, we caught some five or six thousand pounds of large perch at one time ; we picked out a few of the herring, and tripped the seine and let the perch go.

The pond seems to be well stocked with perch of all sizes. Smelts were very numerous last spring, but owing to the hardness of the winter it was impossible to fish for them until the season for catching was about up. We caught some fifteen barrels. There was a swarm of smelts in the fresh streams during the spawning season,—more than has been seen for four years. The pebbles in the streams were covered with spawn.

Very truly yours,

ALLEN LOOK,

For the Lessees.

To the Fish Commissioners of Massachusetts.

GENTLEMEN :—In answer to your circular, I would state that I obtained one hundred and fifty black bass from Sunapee Lake, in Newbury, N. H., and delivered one hundred of them in good condition in Unchechewalom Pond in Lunenburg, on the eighteenth day of August, 1874, and fifty of them in Massapog Pond on the same day. The first-named pond contains one hundred and twenty acres, and is very deep ; the last named, sixty-two acres. I posted printed cards, stating the facts respecting the fish and the conditions of the lease, around the ponds, cautioning all persons not to violate the prohibitions of the lease under the penalty of the law in such case made and provided, and on diligent inquiry I find the law is observed.

The only enemy the bass have to contend with is the *pickerel*. When we placed the fish in the large pond, I saw a pickerel jump out of the water to escape from the bass, two feet, although he was longer than the bass. I was informed at Sunapee Lake that pickerel are now scarce there, though they were plenty five years ago when the

bass were introduced. It is said the bass will erect their dorsal fin and run under the pickerel to wound him in his tender parts, and will cope with any fish.

I remain, yours, with esteem,

CYRUS KILBURN,

Agent for Lunenburg.

STONEHAM, Dec. 6, 1875.

E. A. BRACKETT, Esq.

DEAR SIR :—No fish have been placed in the waters of Spot Pond since the one hundred black bass were put in as reported last year, and no fish have been removed from the pond to our knowledge. We have caused good watch to be kept of the premises, and have no reason to believe any one has trespassed upon them. From the number of young bass seen near the shores of the pond, it would seem that propagation is going on as rapidly as could be expected.

The opposition by a few persons to the lease and the stocking of the pond, seems to have entirely died out, and all sensible people seem to think that the best interest of the town was secured by taking the lease.

Yours respectfully,

AMOS HILL,

Chairman of Selectmen of Stoneham.

LYNN, MASS., Dec. 15, 1875.

To the Commissioners on Inland Fisheries.

During the first year of my lease (1874) I was unable to obtain such fish as were desired, but in May of the present year placed in said pond black bass to the number of one for each acre, and the number of acres in said pond being in said lease numbered at seventy-five.

The fish were all sizable, weighing from two to four pounds each, and costing upon an average about two dollars and a half per head.

No fish of any description have been removed from said pond by me, or to my knowledge, with the exception of a few pickerel, perch and catfish.

Placing in the fish was attended with some difficulty in the following wise :—

From the ice-cold water in which the fish are kept during transportation, to the tepid surface-water of a pond, late in the spring, the change is very great, and must not be made too rapidly.

This fact was not realized by me until I had caused several fish to be removed directly from the transportation barrels to the pond, with the following singular result :—

The fish bewildered, and, as it were, crazed by the shock occasioned by their too sudden change of temperature, almost without exception made for shallow water, and even endeavored to throw themselves out upon the shore. And for an hour the few fish thus treated before the effect was discovered persisted in the above inexplicable course, though tossed back into deeper water time and again.

I then adopted and subsequently followed a method which completely obviates the difficulty just described, and is as follows : First take the ice from the barrels, then little by little the water, constantly refilling the barrels, and finally replacing the water from the pond ; by which means all danger from change of temperature during removal is obviously avoided.

Possibility of the escape of the fish is another phase of fish-culture.

A few days after my fish were all put in, the pond suddenly rose, and a temporary outlet was formed into which they ran in alarming numbers. Luckily for my venture at pisciculture the brook led through tanneries, which are to most kind of fish impassable, so that, though obliged to assist a few which were unable to get back through the shoaling brook unassisted, I lost nothing, but gained information perhaps worth imparting ; viz., that black bass will run into small brooks.

For their principal spawning-grounds, my bass selected what I had regarded as the least likely spot in the pond, being a rocky bottom in the track of a bridle-path along which cattle hourly pass during the grazing season, often pausing to drink and wade about. The place is moreover easily accessible, and much used for boating and bathing purposes.

The spawning-beds, of which I made out about a score, were generally in about three feet of water, being merely a cleared or levelled space, circular in form, and about three feet in diameter.

Of the number of fish hatched this season, I can give no definite estimate ; but during the latter part of the summer, I saw what I believed to be young bass in schools of considerable size.

Before closing this report, I would say that during the spawning time of the bass, numbers of catfish were to be seen in and about the region of the spawn-beds, and out of their usual feeding grounds ; but whether or not this voracious species of fish were drawn thither to feed upon the spawn, did not appear.

Respectfully submitted.

JOHN L. SHOREY,
Lessee of Brown's Pond, Peabody.

WESTBOROUGH, Sept. 30, 1875.

To the Commissioners of Inland Fisheries.

GENTLEMEN:—On the 29th of March last, this town voted to apply for a lease of Chauncey Pond, and on the 1st of April a lease for fifteen years was received from your Board. Chauncey Pond is one of the most beautiful in the State, containing nearly two hundred acres, and is well known to all visitors to the Reform School, which is located on its northern shore.

Nearly the whole shore is fine sand or pebbles, with a very gradual slope towards the centre, where the depth is from twenty to thirty feet. Two small streams (from springs near by) empty into the pond, and it has an outlet running to Little Chauncey Pond in Northborough, except during the driest part of the year. This outlet (by your advice) we have screened, first with rods three-quarters of an inch apart, to catch drift, and back of that with wire netting of one-quarter inch mesh, which we can confidently assert to be impenetrable either to fish or water, after a few days accumulation of floating leaves and rushes.

During the summer of 1870 fifteen black bass were put into the pond by the Commissioners on Inland Fisheries, since which time it has been under the control of the trustees of the Reform School, until April 1, 1875. On that day several persons, thinking the pond not covered by lease, fished through the ice in the forenoon and caught a large number of pickerel and perch; the pickerel were lean, the perch in good condition and of large size, many of them weighing one to two pounds each. One bass was caught, estimated by several who saw it to weigh eight pounds. It was immediately returned to the pond.

The fishermen readily took up their lines and left on being notified that the pond was leased. The lease requiring the pond to be stocked with fifty black bass, after correspondence with several parties, an agreement was made with Stone & Hooper, of Charlestown, N. H., to furnish that number. "of an average weight of not less than a pound and a half each." On the 19th of May last, Mr. Hooper delivered fifty-five Champlain bass, in excellent condition, and assisted in putting them into the pond. The average weight was about two and a half pounds, some of the largest weighing four and five pounds each.

Our opportunities for observation have been limited, but large bass have been frequently seen near the shore, and occasionally at the surface of deep water. August 27, on the south side of the pond, where large bass were often seen earlier in the season, the water was swarming with small fish, about two inches long, supposed to be bass, as it was something never before noticed. If so, it leads

to the conclusion, either that the old stock had greatly multiplied, or that the bass received this spring spawned, and that these were their progeny, although there were doubtless many in the pond before, eight or ten of good size having been caught by one of the trustees of the Reform School in the fall of 1874.

Several persons were detected fishing on the evening of June 5, and complaints were made against four. Three plead guilty and paid the lowest fine of one dollar with costs, and one escaped conviction. There has probably been considerable illegal fishing during the past season, but it is believed that the certainty of prosecution following detection, and the probability of heavier fines being imposed for conviction, will have a tendency to prevent future violations of the law, except by the most reckless.

As a matter of interest to the public generally, showing the increase and spread of fish when protected, we would like to mention a fact which has come to our knowledge, but which may not be considered as properly belonging to this report. About the 25th of May last, black bass were discovered to be quite numerous in Mr. Wood's factory pond on the Assabet River, in Northborough, about four miles from Westborough. A few days later, farther up the stream, having passed two more dams on their way up, several were caught in or above Mr. Eam's pond, and brought to Hockomocko Pond in this town.

These fish probably came up the Assabet after passing from Lake Cochituate or Waushakom Pond, through Sudbury River, thus showing that the stocking of ponds will stock other waters not originally intended.

Hoping next year you may receive a more valuable and satisfactory report, I remain,

Yours truly,

C. O. LANGLEY,

For Committee.

MILFORD, Dec. 6, 1875.

To the Massachusetts Commissioners of Inland Fisheries.

DEAR SIRS:—We put into our pond, in 1870, forty-eight black bass, and six rock bass; and have taken one hundred from the pond to stock Farm Pond in Sherborn. I have not a positive knowledge of the whole number of fish caught since the stocking of the pond; I should think perhaps there had been taken two thousand in all during the six years we have held the lease. Those caught weigh from one to four pounds. In high water some have escaped and gone into Blackstone River, and stocked that stream. As yet there

are plenty of perch for food, and the bass taken are in fine condition. We have not fished in the winter, and to a limited extent in the summer, so as to get mature fish in the future, and the pond is at present well stocked with bass weighing four and five pounds. There has been some poaching, which we could not wholly prevent.

Yours respectfully,

DWIGHT RUSSELL,

For the Lessees of Mendon Pond.

LINCOLN, MASS., Oct. 14, 1875.

To the Commissioners on Inland Fisheries.

The lessees of Sandy Pond take pleasure in reporting that the results of the past year have been encouraging. We stocked the pond in May, 1872, with 52 black bass, weighing not less than two pounds each. None were taken until the past season, and none have been killed so far as we know, except as named below.

One was killed early in the month of June by blasting in excavating for laying water-pipes. This fish was found floating in the water the next day after the blasting, and weighed $3\frac{1}{4}$ pounds.

June 18 one was caught, while fishing for perch, judged to weigh a pound.

September 11 three were caught, one of which measured $13\frac{1}{2}$ inches in length; and at various other times they were taken weighing from one-quarter pound to four pounds.

The fry have been quite plenty about the rocky shores, of the length of two inches to six inches, leading us to believe that after one or two years more the fishing will furnish abundant sport and at the same time plenty of food for the fisherman. We have not been troubled by poachers, and hope not to be.

The laws seem sufficient to protect the fishing under the leases, but it has occurred to me to ask what is to become of the fish when the leases expire? If there is no restraint upon fishing, what reason have we to hope that the ponds and streams will not share the same fate of the trout brooks of the State?

I hope the Fish Commissioners will urge upon the legislature the necessity of passing some law whereby the towns may regulate and control the fisheries in the great ponds within their limits, when they are not leased from the State.

Very respectfully yours,

JAMES L. CHAPIN,

For the Lessees of Sandy Pond,

WESTBOROUGH, Oct. 1, 1875.

To the Board of Commissioners on Inland Fisheries.

GENTLEMEN :—The lease of Hockomocko Pond, granted by your honorable body, under date of July 1, 1874, to L. N. Fairbanks and others, was immediately assigned to an association of gentlemen, twenty-four in number, and styled "The Hockomocko Fishing Club."

Hockomocko Pond contains about twenty-eight acres, with depth of water of from six to ten feet; is fed almost entirely by springs, and varies very little in depth (not more than six inches), whether the season is wet or dry. Water is constantly running at the outlet throughout the year. Last spring, a suitable screen was placed at the outlet to prevent fish from passing.

There were taken from the pond through the ice last winter seventy-five pickerel and about twenty-five perch.

On the 13th of May last, fifty-four black bass were placed in the pond, all in good condition, the average weight of which was judged to be two and one-half pounds each. Several of these weighed five pounds each. Afterwards, in June, five additional bass were placed in the pond, making in all fifty-nine.

In the same month, fourteen brook trout were placed in the pond. At various times during the summer, numbers of the bass have been seen in the waters of the pond. At one time, fifteen of them were counted near the screen, and it is probable that all the fish lived and will stock the waters with their progeny.

During the months of August and September, schools of young bass have been seen.

Respectfully,

GEO. O. BRIGHAM,

Secretary Hockomocko Fishing Club.

PITTSFIELD, Oct. 1, 1875.

To Mr. E. A. BRACKETT, of the Commissioners on Inland Fisheries for the State of Massachusetts.

The lessees of the "Pontoosuc Lake" submit, as their annual report, that, during the last year, they procured four or five hundred "land-locked salmon," from your Board of Commissioners, and put them in said lake, or in a stream emptying into said lake. Said fish were small fry, two, three or four months old. This is all that has been done in the way of "stocking." We are encouraged to think

that our previous "stocking" is doing well, and that the leasing of "Pontoosuc Lake" will result greatly to the advantage of the public.

Respectfully submitted.

E. H. KELLOGG,
For the Lessees.

ASHBURNHAM, Dec. 1, 1875.

To the Commissioners on Inland Fisheries.

SIRS:—In presenting the annual report upon the stocking of our Nankeag Lake with black bass and land-locked salmon, I have little to add to the quite full returns of last year. Upon the 17th of May last, I put into the lake about one thousand salmon-trout fry, hatched from spawn received of Mr. Seth Green; and, in the following July, five hundred land-locked salmon fry, which were obtained of Mr. Commissioner Brackett, in fine order, and without the loss of a single fish in transportation. Also, in June, were put into the lake, about one hundred yearling land-locked salmon, varying from two to four inches in length.

During the season, repeated visits and observations have been made, and young salmon-trout and land-locked salmon have been seen by myself and others. The large black bass are constantly noticed swimming about in pairs, while their young fry are, at the same time, found in shallow waters. I have no hesitation in saying that the restrictions placed upon fishing have been carefully observed by our people, and the best of feeling is entertained towards the project. The evidence of inhabitants dwelling upon the shores of the lake, and my own experience in watching the enterprise, lead me to assure your Board that there is no doubt of its ultimate success.

Very truly, your obedient servant,

OHIO WHITNEY, *Agent.*

NORTH ANDOVER, Nov. 26.

To the Commissioners of Inland Fisheries.

GENTLEMEN:—The lessees of the Cochickewick Lake, or Great Pond, so called, in North Andover, have organized, under the name of the Cochickewick Fishing Club, with the following officers:—*President*, Hon. George L. Davis. *Treasurer*, Col. Eben Sutton.

Secretary, J. D. W. French. Executive Committee, Hon. Moses T. Stevens, Chairman; James H. Davis, John A. Wiley. A copy of constitution, etc., is inclosed. In May last, one hundred black bass were placed in the lake; during this month, November, one hundred and seven; and previously, in the fall, three—making in all two hundred and ten black bass, of an average weight of two pounds; thus having complied with our contract in full as to the number and weight of fish.

Yours, respectfully,

J. D. W. FRENCH, *Secretary.*

NEWTON CENTRE, Dec. 23, 1875.

To the Commissioners of Inland Fisheries.

GENTLEMEN:—In reply to your request to give some particulars as to the progress of our fish-culture in this place, I would state that this is the fifth year of our lease from you of Crystal Lake (more generally known as Baptist Pond). This year we voted that each member of the club be allowed to catch twenty-five fish. During the spawning season many bass were seen upon their beds in various parts of the pond, in four to six feet of water, and in several instances they attacked the boys while bathing, and once or twice brought the blood by their bite. They are very ferocious when upon their spawning-beds.

We think, upon the whole, our expectations have not been fully realized in regard to the sport that we anticipated in taking fish this season. They seemed very loth to rise, and after several unsuccessful attempts at trolling with a spoon-hook and fly-fishing, deep fishing was tried, with shrimps for bait, with good success, but far less sport. I think more than half those caught this year were taken by sinking near the bottom, in about eighteen feet of water. It has been suggested that the bass find the food so plenty in these waters that they are not inclined to bite freely, and some express doubts as to the abundance of bass, which would naturally be expected from the original one hundred and two fish put in this pond five years ago. There are many suckers that make their appearance every spring, and 'tis possible they may destroy much of the spawn of the bass. Yet it is hardly probable. If the bass will attack the bathers who encroach upon their beds, they would certainly defend them from any fish.

We have caught this season thirty-seven bass, weighing in the aggregate seventy-three and a half pounds: the largest three pounds

and a fourth, the smallest one-half of a pound. All weighing less than one pound we immediately returned to the water.

E. M. FOWLE,
Secretary Newton Black Bass Club.

WAUSHAKUN FARM, SO. FRAMINGHAM, MASS., Dec. 23, 1875.

To the Commissioners on Inland Fisheries.

GENTLEMEN :—In response to your inquiry concerning the fishing in Waushakun Pond I have little to report. Although the lake seems abundantly stocked with fish, yet angling has been a profitless pursuit. Why we should see so many fish about the spawning-ground in spring and early summer, and be able to catch so few during the season, is a problem difficult to solve. The only probable hypothesis that I can offer is that the abundance of feed surfeits the fish, and therefore we cannot count upon hunger as an ally to lure them to our snares. However this may be, the pond, in localities, swarms with minnows and shiners. The perch, however, I fancy, rather than know, have diminished in number, and I can say with considerable certainty that the pickerel have diminished.

During the past summer I have angled with success twice on Mendon Pond. There the fish are abundant, and take bait sharply. The pond, once said to abound with the ordinary pond fish, now contains apparently nothing but bass in any number. At Plymouth I have sought bass in several ponds with but little success, and have made many inquiries concerning them of those who ought to be familiar with their traits. At the best they seem a capricious fish, and apparently (perhaps through limited information) have different habits in different ponds, and frequent different shores throughout the season. They do take a fly sometimes, but I am not disposed to call them a satisfactory fish for the fly-fisherman. Indeed, I am disposed to believe that as a food-fish they have been overpraised. I conjecture that they are about as voracious as the pickerel, and require full as much food for their size, while I know that in spawning habits they are his inferior. Thus :

Jan. 14, 1875, I examined a pickerel weighing $2\frac{1}{2}$ lbs. weight of spawn, 1,339 grains; 247 spawn weighed just 10 grains. Total number of spawn, therefore, about 33,173.

Per contra : Jan. 9, 1875, a bass, weighing about $2\frac{1}{2}$ lbs., contained 949 grains of spawn. The boiled spawn, freed from membranes, etc., weighed 820 grains; 206 eggs weighed just 10 grains. The total number of spawn therefore about 16,892.

Again, the young pickerel soon hide in the weeds along shore, while the young bass, when first hatched, form dense, compact, swarms, from which the mother fish and other predatory inhabitants can readily poach large numbers. I am aware it is said that the mother fish guards her young, but I feel assured that while this may perhaps be true in some cases, yet in other instances the opposite is true. Perhaps the habits of the young fish relieve the parent largely from temptation, for small as the fry are, and compactly as they are grouped, yet they occupy the surface of the water, and are, probably, if not invisible, yet inconspicuous to the fishy eye. I have seen, however, the two-or-three-pound mother taking large gulps from the midst of her innocent, for as yet infantile fry. Soon, however, these groups of fish become scattered, and the individuals, governed by a wise instinct, seek the cover and the protection of the shore. Here they grow with considerable rapidity, feeding upon all the weaker fry that come within their reach. Often have I seen a three-inch pirate sally from port and chase an inch-and-a-quarter minnow; and the same fish, when tempted with a dead minnow an inch and a half long, will do his little best to get outside of him.

The young fish do not necessarily remain in shallow water. From an inch, to the growth of the season, they may be seen, active and vigilant, about heaps of stones, anchored boats, in fact any cover in water from four to six feet deep; and I have myself known, as well as learned from others, of the young fish, two and three inches long, being brought into our sail-boat through the centre-board well, when the centre-board has been rapidly raised.

I am no friend to the pickerel. I despise him, both as an edible or as a sportman's fish. But all are not educated as sportsmen, and I believe the pickerel to be our best fish for waters liable to be fished by the public in season and out. To keep our waters stocked with bass, will necessitate a close season from the formation of ice to the end of June. This may seem a strange assertion, but I am satisfied that in some lakes the bass may be considered a winter's fish. Indeed, it has taken the greatest care on our part to prevent taking bass through the ice. Unless, then, this close season be enforced, let the public rather encourage the pickerel than the bass. The bass is the sportman's and the epicure's fish, and if the fishing for him is well regulated, his introduction is a boon to the public. The most serviceable fish, however, is that one which may be caught any day in the year.

There is one little fish which seems strangely to have escaped attention. This is the red-fin, or stream pickerel. The mature growth brings them to perhaps nine inches or less in length. March 15, 1875, I weighed one, and counted the spawn. Weight of fish,

521 grains; of spawn, 127 grains; 117 spawn weighed 5 grains. Total number, therefore, 2,972. This fish, in his plumpness, reminds us of the smelt, and it is possible might be a profitable fish to grow in certain waters.

I will now proceed to give my record of Waushakun Pond, in the manner I have in previous years; premising, however, that it is probable that some few of the catches have not been reported. The record continues where I left off last year, and it will be noticed takes note of some winter fish.

1874.

Oct. 27. One fish; 3 pounds.

Dec. 26. One fish; $2\frac{1}{4}$ pounds.

1875.

Mar. 17. One fish; $2\frac{1}{2}$ pounds.

Mar. 24. One fish; $1\frac{3}{4}$ pounds.

Mar. 26. One fish; 3 pounds.

Mar. 27. Two fish; 3 pounds, 3 pounds.

May 15. Saw first black bass (swimming) of the season. Hooked him over the spawning-beds, but did not take from the water. Apparently swollen with spawn.

June 11. Black bass fry in myriads about boat-house. Some lots apparently a day or so older than others.

June 19. One fish; $1\frac{1}{2}$ pounds.

June 21. Two fish; $1\frac{1}{2}$ pounds, $1\frac{1}{2}$ pounds.

June 22. One fish; 3 pounds.

June 25. Small fry along shore from 2 to $2\frac{1}{4}$ inches long; some swollen. Last year's hatch from 6 to 7 inches long.

July 8. Three fish; 1 pound, $1\frac{1}{4}$ pounds, 3 pounds.

July 12. One fish; $2\frac{1}{2}$ pounds.

July 16. Small fish from $1\frac{1}{2}$ to $1\frac{3}{4}$ inches long, in considerable numbers. Smaller than those recorded in June.

July 17. One fish; $1\frac{1}{2}$ pounds.

July 22. One fish; $2\frac{1}{4}$ pounds.

July 25. One fish; $1\frac{1}{4}$ pounds.

July 27. Caught one black bass, $2\frac{1}{2}$ inches long. Washed into sail-boat, through raising the centre-board.

July 28. Five fish; $\frac{3}{4}$ pound, 1 pound, 1 pound, $1\frac{1}{2}$ pounds, $1\frac{1}{2}$ pounds.

July 29. One fish; $1\frac{1}{4}$ pounds.

July 31. One fish; $\frac{1}{2}$ pound.

Aug. 16. Two fish; $1\frac{3}{4}$ pounds, 3 pounds.

Aug. 18. Two fish; $\frac{3}{4}$ pound; $1\frac{1}{4}$ pounds.

Aug. 19. One fish; $1\frac{1}{2}$ pounds.

Aug. 24. One fish; $2\frac{3}{4}$ pounds.

Aug. 25. One fish ; $1\frac{1}{4}$ pounds.

Aug. 26. Two fish ; 2 pounds, $3\frac{1}{4}$ pounds.

Sept. 9. One fish ; $\frac{1}{2}$ pound.

Sept. 10. Young bass about boat-house, from 3 to 6 inches long.

Active and hungry. Freely take minnow-bait.

Sept. 23. One bass ; 4 pounds.

Oct. 9. Three fish ; $\frac{1}{4}$ pound, $\frac{1}{2}$ pound, $\frac{3}{4}$ pound.

Nov. 19. One fish ; 4 pounds.

In October seven fish were taken, but were lost through upsetting of a boat. Hence they were neither weighed or included.

Total catch for the season recorded : 40 fish, weighing $73\frac{3}{4}$ pounds.

June 12, 1875, we placed 45 white perch in the pond, and June 26, 80 additional ; none weighing over a pound.

Respectfully submitted.

E. LEWIS STURTEVANT.

[C.]

SKETCH OF THE PROGRESS OF FISH-CULTURE IN
NEW ENGLAND.

By THEODORE LYMAN.

Massachusetts was the first State that took action in fish-culture. By a legislative Resolve of 1856, commissioners were appointed to report "respecting the artificial propagation of fish."

News of the French experiments had been spread by Silliman's Journal in 1853; and Kellogg in Hartford, and Garlick in Cleveland, had hatched and raised trout. The report written by the late Chief Justice Chapman was full of useful matter, and gave the outline of all that we now know of this subject. He suggested different fishes for different waters: the introduction of exotic species, and the artificial propagation of native ones. With a singular spirit of prophecy, he said: "It is believed that, by means of artificial propagation, the river below Hadley Falls might be vastly better stocked with shad than it has ever yet been." His remarks on legislation contain instruction that goes beyond mere pisciculture. Deprecating our tendency to imitate the French in excessive and overminute law-making, he said: "No legislation will avail till private enterprise shall ascertain its own wants." Special enactments, by their vast accumulation and their confusion, have become the bane of our people, who are now so accustomed to them that they look with suspicion on general laws, and prefer to draw, each one, his little measure of authority direct from the General Court. There have been passed up to this time (1875) over four hundred statutes concerning fisheries: the bulk of them either clumsy or quite useless. The economy and clearness of a well-drawn *general* statute are shown by the fact, that only about half as many fishery Acts were passed during the six years that have succeeded the Act for encouraging the cultivation of useful fishes, in 1869, as during the preceding six years: albeit the interest in pisciculture was many times greater during the period of fewest laws.

The report of the commissioners of 1856 finished with an account of Capt. N. E. Atwood's attempt to hatch trout, and a translation of Jules Haime's article on fish-culture, printed two years before in the *Revue des Deux Mondes*, the best resumé of the subject that has ever been written. In 1850, about seven years after the readoption of artificial impregnation by Rémy, the French took up pisciculture with ardor, and carried its theory almost as far as it since has gone. The artificial spawning-bed, hatching-troughs, methods of feeding, and modes of transporting eggs and young, were all discovered or used by them. They investigated also the comparative vitality of spermatozoa, the swelling of eggs in water, and the temperature best suited for hatching. On the practical side their failure was as conspicuous as was their success on the theoretical. Prof. Coste, a learned but overenthusiastic person, had chief charge of the great establishment at Huningue, which was laid out under direction of the best engineers. Begun on a scale untried and too costly, the enterprise turned out not much better than an expensive toy. It was ill-placed, on the flat alluvium of the Rhine, so that the spring water had little or no fall, and it was impossible to make ponds or raceways by damming. Pools for the young fry had to be excavated at much expense, and when done they got peopled with pickarel from the back water of the river. Buildings and appliances of a size and elaborateness wholly uncalled for were put up; and then a turbine wheel was mounted to pump water over the eggs. This turbine was set so high that, at low stages of the Rhine, it had no power, and hand-pumps were required. The fry, set free in various waters, were sometimes not numerous enough, and sometimes were placed in unfavorable localities, so that the increase (excepting the brook trout) was insignificant in comparison with the expectation. At present the German government carries on the establishment, but its success, considering the disadvantages, may be considered doubtful. The ill-fortune of Huningue should not rest on the memory of Coste, but be laid rather to the extravagant and meretricious spirit of the second empire. Nor should it be forgotten that the experiments there conducted have been of great service, by showing what can and what cannot be accomplished.

Although thus valuable, the commissioners' report roused no public interest, and it was not till the end of the war, in 1865, that the subject was again taken up; not indeed for itself, but in connection with another question. In July, 1864, New Hampshire and Vermont had passed legislative Resolves, calling on Massachusetts to open free passage to migratory sea-fish through the dams on the Connecticut and Merrimack rivers. A joint committee of our General Court held a hearing in March, 1865, at which all parties

interested appeared. Judge Henry A. Bellows, on behalf of New Hampshire, stated, that in former days, when the rivers were open, great numbers of salmon and shad ascended the Connecticut and Merrimack, to the waters of Vermont and New Hampshire; but that these fishes had, for some years, been cut off by impassable dams, erected for manufactories. He admitted that several of these dams had been authorized by New Hampshire; nevertheless he thought that state comity demanded the restoration of the fisheries. All parties were agreed that fishways could easily be made over the dams; and Prof. Agassiz explained their structure, and showed the method of artificial breeding.

The three points raised against any action by the Commonwealth were: 1. The possible vested right of owners to maintain their dams intact. 2. The pollution of waters by factory refuse, making fisheries impossible. 3. The lack of sufficient water to furnish both mill power and fishways. In regard to the first point, it appeared that about 1792 a company for river navigation by locks and canals was chartered both on the Connecticut and the Merrimack. These were afterwards bought out by other companies, which built closed dams at Turner's and at Hadley Falls on the former stream, and at Patucket (Lowell) on the latter, where also the Essex Company built an impassable dam, in 1847, at Lawrence. For this dam the county commissioners, with supreme ignorance, prescribed as a fishway, a trough fifty feet long and thirty wide, having a rise of one foot in four (!) In 1851 the legislature ordered the Essex Company to substitute a sufficient fishway for the ridiculous structure then existing. But the supreme court properly decided that this ridiculous character was no fault of the company, which had followed the prescription of the county commissioners, and was therefore not held to substitute anything else. The Lowell dam was low, and passable at good water. For neither of the dams at Holyoke or at Turner's Falls was any fishway prescribed by law, but the Holyoke owners were ordered to pay for the fisheries destroyed above the barrier.

The joint committee arrived at the following conclusions: 1. That the Lowell dam was held to build a fishway. 2. That the Essex dam was held to build only the useless way. 3. That the Holyoke dam was exempted from building a way. 4. That two commissioners should be appointed fully to report on the subject, and to confer with commissioners of the other States.

Early in the summer of 1865 Theodore Lyman and Alfred A. Reed were appointed commissioners under the above recommendation, and made their report the December following.

Premising that salmon, shad and alewives were the most important

fishes to be considered, they described their habits, as far as then known, and the conditions of their multiplication. Mr. W. S. Treat had determined that alewives needed four years to attain their full size, and a similar growth was by analogy attributed to the shad. This guess was confirmed in 1867, when Mr. Fred. Russell, Commissioner of Connecticut, showed that "chicken shad" were simply yearlings, or two-year-olds. In 1866 Mr. Lyman figured the young in autumn, before its descent to the sea, and, in 1867, the embryo, in the egg, and newly hatched.

The habits and growth of the salmon were likewise explained, and there was a description of the "land-locked" salmon, which then was thought to be a descendant of the migratory species, when accidentally shut off from the sea. Some naturalists now maintain that it is a distinct species of lake trout; but the question, in the face of inextricable varieties of *Salmo*, is not one of much importance. That the embryos and the fry are not distinguishable from those of the true salmon, was proved at the state hatching-house in 1869.

In regard to water-power companies, the following facts were noted: In order to establish what used to be called "slack water,"—that is, smooth water in places of rapids and shoals, which was the aim of the old locks and canals companies,—it was necessary either to build a wing-dam to back the river up, or to construct a canal round the obstacle. Such structures injured but did not destroy the fisheries.

The manufacturing associations which came after had an aim quite different; namely, to make a high and abundant head of water, and to direct it through a canal, whence mill-wheels might be fed. Therefore they built closed dams, and raised them as much as possible; and when more power was needed they got further elevation by placing "flash-boards" edgewise along the dam-crest.

As the increasing mills demanded more and more water, they established reservoirs, by damming lakes at the river-head, and thus holding them back till the dry season. The result of all these measures was, that manufacturing rivers got full of dams impassable to fish, that the ancient levels were altered, and the spawning-beds covered or swept away.

A secondary result was the fouling of rivers with refuse from the mills, such as chlorine and salts of lime from paper-mills, and soaps and sulphuric acid from print-works. The effect of such pollutions is more local than is commonly thought. Analyses of Merrimack water, a few hundred feet below the great print-works at Lawrence, when the river was low, and the foreign substances at their maximum, showed little more than a few grains of neutral salts to the gallon, the impurity being less than in common spring water. The reason of this "working clear" is, that ordinary rivers hold suspend-

ed a great quantity of minutely divided matter, either mineral or organized, of which the latter may be living or in process of disintegration. This matter, lime, albumen, fat, etc., speedily makes harmless and often insoluble compounds with the raw chemicals coming from the vats. When to this chemical reduction we add the dilution afforded by a river, it is no longer wonderful that the pollution occupies a limited field.

As a remedy, it was suggested that plank screens be erected opposite raceways, so as to deflect the foul current, and preserve the centre of the stream pure. As to fishways, it was shown that their construction would be difficult; because, first, the violence of such rivers as the Merrimack and Connecticut was hard to resist when they rose in freshets, and brought down logs and masses of ice; and secondly, that the height of twenty or thirty feet, which was to be surmounted, would necessitate a very long and difficult pass. The kind recommended consisted of a trough, with partial cross-bulkheads to check the flow, alternating with horizontal tanks, wherein the fish might rest. Later experience has shown that the system of resting-tanks is a prime error, and should always be avoided. In view of the extravagant anticipations of some persons, respecting the happy working of fishways, it may be well to quote the language of the Commissioners, to show that they did not furnish the grounds for such anticipations. "Supposing all these passes built on approved plans, the next question is, *What would come of them?* In the first place, then, no salmon would come of them, for the good reason that there are none in either of the rivers. Shad there still are, in considerable numbers, and it seems the belief of many intelligent persons in New Hampshire that these fish would run up, in great plenty, to Lake Winnipiseogee, the very next spring after the erection of the passes. Such a result might follow, and it might not; the strong probability is that it would *not*. . . . Their instinct drives them to go to their own breeding-beds, but, so far as we know, *not to go beyond*. At any rate there is a simple remedy for the trouble. Live shad could be carried up and put in the mill-ponds at Lawrence and Holyoke, and salmon could be bred in the headwaters of the Connecticut and Merrimack. . . . The progeny of these pioneers would certainly go up the year after. . . . Shad are not inclined, like alewives, to run up every shallow brook that presents itself, . . . and it is to be feared, will be shy of any fishway that is not approached by a channel a dozen feet wide and a couple of feet deep."

These views, however moderate, were yet too sanguine. The aversion of shad to narrow flows of water has proved even more marked than was looked for. Despite many improvements in the great fishways at Lawrence and at Holyoke—improvements that

have rendered them probably the best in the world—the number of shad that pass over is still very limited. It is confidently hoped that other devices, now under construction, and the planting of many eggs in the upper waters, will increase the number to a satisfactory figure; but that is one of the unproved things. Alewives, lampreys, eels, pickerel and other fresh-water fish, pass in numbers with the greatest ease. The Commissioners were of the opinion that “an abundant supply of fish might be looked for in five years,” *provided* fishways were built, pollution of water prevented, salmon bred, weirs and gill-nets prohibited, and stringent laws passed regulating fishing.

These conditions have, in the sequel, been partially complied with, and the success has been consequently partial. The shad have been considerably increased in the lower Merrimack, and in the lower Connecticut almost restored to the abundance of early times. Nothing effective was accomplished in salmon fishing till 1872. In 1870 about 1,000 fry were let loose in the upper branches of the Merrimack; in 1872, 16,000; in 1873, 185,000. In 1874 800,000 were set free in the upper Connecticut. According to their average rate of growth, the *parr* becomes a *smolt* the first year, a *grisle* the second, and a *salmon* the third. Therefore this coming summer (1876) ought to show some salmon in the Merrimack, provided young salmon will return to their river without any predecessor to guide them. Already the small plants of 1870 and 1872 have shown themselves by the appearance of salmon in Massachusetts and Buzzard's bays—a spectacle nearly unknown for many years, for the Lawrence dam stopped the Merrimack salmon in 1847—though the survivors continued to come up in small numbers till 1859, thus confirming previous observations, that the life of the salmon is about twelve years. As for the Connecticut, a closed dam, near the mouth of Miller's River, stopped the salmon in 1798.

1866.

The legislature was moved by the report for 1865 to appropriate \$7,000, and again to appoint two commissioners for the space of five years—Theodore Lyman and Alfred R. Field—whose duty it was to cause fishways to be erected in the impassable dams of the Merrimack and Connecticut rivers. (Acts of 1866, chap. 238.) They were authorized to make a compromise with the Essex Company for the useless way in their dam; and a trough fishway, on Foster's plan, was put up, at a cost of about \$8,500, whereof \$3,500 was paid by the company, with the further agreement to pay one-half the cost of maintenance for five years.

At Lowell, the Locks and Canals Company, as by law bound, put

up a fishway at their own cost. It was on the plan of the double stair, consisting of two parallel rows of tanks, each lower than the next one, and emptying left, forward, right, forward, and so on. This plan, then considered excellent, has since been shown to be an inferior one, having, in an extreme degree, the fault of *resting-places*.

The Act required that the plans for the fishways should be first approved by the New Hampshire commissioners, and that then a copy should be filed at the State House, and another given to the company in whose dam the structure was to be erected.

The Act also gave discretion to the commissioners to postpone the erection of a fishway at Holyoke, if the State of Connecticut had not made provision for the abatement of weirs and other destructive engines; and this was done, partly because the Holyoke Company declined to build a way, on the plea that they were exempt. Notice to be prepared to build a fishway was served on the Turner's Falls Company, which had begun to replace the old broken dam by a new one. In the autumn of this year (1866) Dr. Fletcher, by direction of the New Hampshire commissioners, placed 15,000 to 20,000 New Brunswick salmon eggs in the Pemigewasset, and the parrs were afterwards seen near by. Of the shad it was definitely ascertained that the young, of the summer's hatch, leave the river for the sea before the end of November, and are then about four inches long.

1867.

In furtherance of previous action, the legislature passed, in 1867, two important Acts. Chapter 289 interdicted catching of shad, salmon and alewives in the Merrimack for four years, till April, 1871; forbade any fishing within four hundred yards of any fishway thereon; empowered the commissioners to open its tributaries by fishways; and directed cities and towns on its banks to appoint fish wardens. Chapter 344 enlarged the Commissioners' powers by allowing them to open all possible streams to the passage of fish; and appropriated \$10,000, to be by them used in restocking rivers and ponds with valuable fish.

It will be observed that, from being charged simply with bridging certain obstructions in two rivers, the Commissioners had authority to open all streams and to undertake pisciculture; and, as will be seen in the sequel, their second powers were much more profitable than the first.

The Merrimack fishways at Lowell and Lawrence were opened; and two or three salmon were afterwards reported as taken in the upper waters. They have since been supposed to have been lake trout, which the New Hampshire people mistook for salmon; a point which cannot now be settled. Doubtless salmon could have gone

up, although the rush of water at the Lawrence fishway was too violent for the weaker kinds of fish; and not even the inventor, Mr. Nathan W. Foster, had then enough experience with wide fishways and high dams, to moderate the flow. Subsequent study showed that the slope (one in ten) was too rapid; and that the cross-bulk-heads, slanting up-stream, were not so arranged as to check the current in a uniform manner. As the shad no longer came in numbers to the Essex Company's dam at Lawrence, 500 were carried in a water-tank and placed in the river above, so that their young might pass down the fishways, and on their return, as large fish, might seek to mount them.

The following year (1868) shad eggs were carried in pails of water and put in Lake Winnipiseogee, in Concord River, and in Mystic River, and alewives were transported alive above the Lawrence dam. In the autumn of the same year shoals of young fry (shad or alewives, or both) were seen above Lowell, passing seaward. It is pretty certain that these young, and perhaps those of 1867, found their way to the sea, because, in 1871, large shad came in numbers to the foot of the Lawrence dam, but declined to follow their tamer cousins, the alewives, into the fishway. In 1869, 1870 and 1871, shad were hatched in quantities, at various points above the Lawrence dam.

Dr. W. W. Fletcher made an expedition to New Brunswick after salmon ova, and succeeded in obtaining 70,000. The want of proper apparatus, and the difficulties by which he was surrounded, rendered it impossible to impregnate many of the eggs, so that only about 10,000 were finally hatched; whereof 5,000 were placed at the establishment of Livingstone Stone, at Charlestown, N. H., and 5,000 with T. S. Robinson, at Meredith. Like many pioneer experiments, this one resulted in more experience than profit. The Charlestown parrs were killed by a sudden hot spell, and of those at Meredith many were lost by a freshet, so that only about 1,000 were at last put in the upper waters of the Merrimack.

This year began the case of the great Holyoke fishway, the most important one of its kind that ever came into the courts of this country, or perhaps of any other. Being invited by the Commissioners to make a compromise, in which most of the cost would be borne by the State, the company refused, and moreover hinted at damages in the event of any infringement on their water-power. The directors, in thus opposing the Commonwealth on a doubtful law point, pursued a short-sighted course, which they had reason to regret. Insufficient funds and high water prevented any work on the fishway for that year, but the following season (1868) lumber and workmen were got together to begin the structure, under an agreement by which the

company waived the prescribed notice, and promised to abstain from an injunction. The legislature had voted \$12,000 (Resolves, chap. 53, 1868) to construct the fishway in case the courts should decide that the State was liable. At that moment it was discovered that the dam itself was undermined in such a way as to place it at the mercy of the next great freshet. Therefore the Commissioners transferred their material and mechanics to the company, under a verbal pledge that the fishway should have certain advantages of position, which advantages the directors did not see fit to concede, after the dam had been secured.

At its next session the general court passed an Act (chap. 422, 1869) by which the Commissioners were empowered to bring a bill in equity in the supreme court against any company neglecting or refusing to build a fishway. Meantime the company's engineer built the chief part of the way in connection with the great apron reared to strengthen the dam, and it was left to the court to decide who should pay for it. The case was conducted by Mr. Charles Allen, the attorney-general, and on the 31st of August, 1870, the supreme judicial court ordered a decree from the complainants. The defendants appealed to the supreme court of the United States, which, at the December term of 1872, affirmed the decree, and the Holyoke Water Power Company thereupon paid for the fishway.

The grounds of these decisions are such as may easily be understood, and are as follows: 1. A river is a public way. 2. The passage of migratory fish in a river is a public right. 3. Whoso builds a dam must furnish a passage to migratory fish, unless exempted by the legislature. 4. In a legislative charter any privilege which is not expressly granted is withheld.

The Holyoke Company claimed exemption because a clause of their charter compelled them to pay awarded damages to owners of fish rights *above* their dam; and, as they had paid such damages, they were by implication no longer held to furnish a passage for the fish. But the court decided: 1. That such damages did not necessarily imply that the fish rights above the dam were to be destroyed, but only *injured*, as likely they would be, even with the best fishway. 2. That fish rights *below* the dam had been injured, and no compensation therefor had been given. 3. That exemption from building a fishway was not expressly granted in the charter, and was therefore withheld.

The history of this case—so important in many respects other than fisheries—is a curious one, and shows how a common man, devoted to a specialty, and excited by opposition, will sometimes see points that are passed over by experts. A lawyer of high standing, and an attorney-general, had given opinions that the Holyoke

Company was not held to build a fishway; and another attorney-general had strongly advised compromise because the case was so doubtful. One of the commissioners, who had been deeply interested in the matter, suggested that the fisheries *below* the dam had certainly been injured by cutting off the fish from their upper spawning-grounds, and that the company was thereby liable to build a fishway, since it was not specially exempted.

This case, when it came to trial, instead of proving desperate or dubious, was found absolutely to have but one side; namely, the side of public rights.

In the report for 1867, the next subject in order was the restocking of exhausted waters. It was shown that a very small fraction of eggs laid became marketable fish. Thus the English calculations brought only one salmon from 1,500 eggs; and, at this rate, 20,000 eggs, at the end of three years, would give only seven salmon and 70 grilse. Taking the observations of Green and of others on the eggs of shad, it appeared probable that not more than one in 20,000 grew to be a two-year-old; and not more than one in 40,000 attained to the full growth.

For the alewife there were two kinds of observations which could be used, and the determination was perhaps more reliable than for the salmon or shad. It gave a range from one full-grown for every 2,363 eggs to one for every 47,500 eggs, according to the concomitant circumstances, the mean being one in 18,865. "Such calculations must, in the nature of things, be very crude, and yet they show that, whatever points are taken as premises, the conclusion is always similar in character, and is in brief this: The reproductive function among animals has two ends: 1, the perpetuation of the species; 2, the supplying of organized material as food. This law is especially illustrated among the fishes, of which the greater part are carnivorous, and indiscriminately devour their own young or that of other species. The ocean is a vast, teeming workshop, crowded with fabrics, torn in pieces ere they are half finished, to be converted into other fabrics, which in turn are as rapidly destroyed."

Artificial culture, by protecting eggs and young, seemed able to greatly increase the proportion of the adult to the ova from which they sprung. Its more enthusiastic advocates hoped to protect the fish in each stage of growth, but practice has shown that the real gain is in the first stage—in the greater number of eggs impregnated and hatched. As soon as the embryo has arrived at the figure of a minnow, its best and safest place is in its native waters. Considering that, by the natural process, only one shad egg in 80 is hatched, it was calculated that four shad at the end of three years would be represented by only seven large and one two-year-old fish; while by the

artificial method, where nine-tenths of the eggs hatch, two pairs in three years would become 252 large shad and 504 of second size, the difference lying wholly in the greater proportion hatched by the latter method. It was these considerations that led the Commissioners to encourage the undertaking of Seth Green, who came this summer to Holyoke, and began experiments in shad-hatching. He first tried the eggs in a trough, in which ran brook water, just as in trout-hatching. All the ova died of cold. He then replaced the bottom and ends of a wooden box by wire gauze, and floated it in the river, after putting in a layer of eggs. After sixty hours the water inside was found to be alive with little transparent embryos, about one-third of an inch long, and looking more like larvæ of mosquitoes than young shad! The discovery was made, and it remained only to perfect the hatching-box, which was done by attaching to its sides wooden bars, lying at an angle with the bottom, so that the box floated with one end higher, and the passing river current caused a boiling motion of the water within, which kept the eggs from getting together in heaps. A large number of boxes were furnished by the State, and, with one exception, hatching has been carried on every season, and on a great scale, at Holyoke.

Usually, it has been under the charge of the Connecticut commissioners, and of late the United States commissioner has also taken part in it. In 1868, Mr. A. C. Hardy, as agent for the Massachusetts commissioners, began hatching at North Andover, on the Merrimack, and has continued regularly since that date, with the following result as to the number taken from June 10 to July 19:—

| | | | | | |
|-------|---|---|-------------|---|---|
| 1869, | . | . | 1,554 shad. | } | No other fishing allowed on the river. |
| 1870, | . | . | 754 " | | Average for two years, 1,154. |
| 1871, | . | . | 2,242 " | } | No other fishing allowed on the river. |
| 1872, | . | . | 2,031 " | | Average for three years, 1,942. |
| 1873, | . | . | 1,555 " | | |
| 1874, | . | . | 1,692 " | } | Other fishing again allowed on the river. |
| 1875, | . | . | 1,433 " | | Average for two years, 1,562. |

The first two years represent the natural catch as it then was. In 1871 Hardy's hatch of 1868 should have come as marketable fish, and, in fact, the next three years show an average nearly double the two preceding ones. In 1874 the river was again thrown open to fishermen, and the average for 1874 and 1875 came between the first two and the second three years. These results would seem to indicate a decided increase in fish by reason of artificial hatching; but the point is not proved, for it must be remembered that, for six years, all fishing in the Merrimack, except at Andover, was prohibited.

This prohibition might well increase the fish, although such increase does not always follow. For example, the shad-fisheries of the Savannah were intermitted during the war, and a decrease, rather than an increase, took place. Reasons were given, such as the frequent and heavy cannonading, the torpedoes, obstructions, etc., but these reasons were, after all, guesses.

In the Connecticut River a marked, and, so to speak, special result has been obtained. The average of the fisheries for the years 1864 to 1869 was only two-fifths of that for the years 1827 to 1836, and each year showed a rapid decline. Suddenly, in 1870, the river was filled with shad! There had been no such take for a generation before. And so, in the main, it has since continued; the season of 1875 having been the best one in twenty years. The price of the fish has fallen greatly, and the New York market is sometimes glutted with them. The result in 1870 has usually and reasonably been attributed to the artificial hatching by Green in 1867, and the succeeding supply has been credited to the same cause. This reasoning is probable, but not certain. In 1868, the Connecticut Assembly passed a law limiting the mesh of pounds to five inches when drawn lengthwise.

The pounds are set in Long Island Sound, west of the river mouth. Some of them are nearly a mile long, and are furnished with two bowls. Twenty-six were counted in the distance of less than ten miles. When set with a fine mesh they took great quantities of fish, down to the size of a small herring, and, among them, yearling and two-year-old shad, sometimes by the cartload. The five-inch mesh of 1869 allowed the smaller shad to escape, which would return in 1870 and 1871 as large fish.

What proportion of the increase was represented by these fish that escaped the pounds it is not possible to state. That they did not represent the *whole* increase seems very probable, because the plenty has continued pretty constantly now for six years, in face of the fact that the pound men have evaded the law to a great extent, except in the year 1872. Nevertheless, the Connecticut, which has been cited everywhere as furnishing a demonstration of the efficacy of artificial hatching, does not present a clear case, but only a probable one. Seth Green from the outset maintained, what doubtless is the correct principle, that the artificial hatching of fish would vindicate its theoretical proportion *only when pursued on a very large scale*; that, for equal surfaces, the same sort of care should be bestowed as in the culture of corn. Doubtless he is right; for it is certain that the artificial process for shad will give many times the number of embryos that the natural spawning will afford. Be the cause what it may, this is certain, that the measures of the Commissioners have

increased shad in the Merrimack and Connecticut; largely in the former, enormously in the latter.

The report described and recommended several fishes as worthy of cultivation, such as the land-locked salmon, the little white fish or shad waiter (*Coregonus, Novæ Angliæ*), the two species of alewife (*Alosa tyrannus* and *cyanonoton*), and the black bass (*Grystes fasciatus*). This last species was brought in 1850 to the ponds of Wareham, from Saratoga Lake, by Mr. Samuel T. Tisdale, whose account of the fish will be found in the report for 1870. From their introduction to his death in 1868, he stocked nearly sixty ponds, of which some were in New Hampshire and Connecticut, but the greater part in Eastern Massachusetts, and especially in Plymouth County. Since that time the Commissioners have superintended the stocking of some forty ponds, in various parts of the State. When to these are added the waters that have been stocked by private persons in their own way, it will be seen that this valuable fish is now pretty well distributed in the Commonwealth. As *Grystes* belongs among the percoids, which discharge their eggs through an oviduct, instead of dropping them free in the visceral cavity, as do the salmon and most clupeoids, all attempts to express the spawn have failed. But the fish is so tough, and so easily transported, that it is only necessary to carry the parent fish and deposit them in the destined water. The report for 1867 ended with directions for breeding of trouts and shad, illustrated with plates.

1868.

The culture of alewives was specially recommended on account of its ease and certainty, and of its immense yield. Some trivial streams in this Commonwealth thus yield, annually, one hundred tons of animal food, which is sold at one-fiftieth of the price of beef. The female lays about 250,000 ova, and, in the breeding season will push into the narrowest rivulets, amid machinery and the habitations of man, to arrive at her bed. One thousand alewives were this season put above the Lawrence dam, and the building of fishways was encouraged on small streams that were closed.

Shad were hatched on the Connecticut as early as June 8, which confirmed the idea of several successive runs of "ripe" fish. Indeed, all testimony goes to show that shad return to a river in bunches or communities, which "strike in" successively, some of them loitering near the mouth, others swimming deep and pushing rapidly to its head. In this way we may account for the variation of fishing in different parts of the same river, and during the same season.

Mr. Livingston Stone established a hatching-house on the Miramichi, and took over 400,000 salmon ova, of which one moiety was

left in the country, and the other sent to Charlestown, N. H. Of the latter about one-half proved to be impregnated, and a portion were afterwards hatched for the benefit of the upper Merrimack.

The Commissioners called attention to the exceptional value of our smelt (*Osmerus viridescens*), and to its alarming decrease, owing to the method of netting great masses of the breeding fish, when they crowded up narrow streams to spawn. Not only had they become more scarce, but smaller; that is to say, almost none escaped long enough to attain their full size. The same result followed in the Connecticut from overfishing of shad, so that the mesh had to be reduced in size to stop the fish. A series of laws have been passed for the protection of smelts (1868, chap. 179; 1869, chap. 64 and 75; 1874, chap. 153). The general purport of the protection was that none should be caught save by hook and line, and that their capture should be prohibited from March 15 to June 1. The immediate consequence of this wise legislation was the increase in number and size of the smelts, so that now (1875) they exist in pristine plenty, and often swarm in their favorite tide-ways. Their capture gives employment to many poor men at a season when work is scarce.

The Commissioners ended by recommending a general law controlling inland fisheries, which would do away with the custom of passing numerous special Acts. When a country is new, game is too plenty and men are too scarce, so that every one may properly enjoy free fowling and fishing. As civilization proceeds, and population grows more dense, game and fish become less and less abundant, until they no longer furnish an important proportion of the food consumed. Then it is that fish and game must, under certain rules, be made *property*, in order to keep up the supply. This point had been reached in New England, where the market in the lack of home products was supplied with venison from Northern New York, salmon and trout from New Brunswick, quails and grouse from Illinois, and ducks from North Carolina. There was nothing new or exceptional in a law of this kind; for the general court had been accustomed to grant property in waters, or in their fish, wherever it seemed for the public good. Thus, fishing was free in tidal waters, and in ponds of over ten acres, *unless* otherwise ordered by the legislature; exclusive right to breed alewives had been granted to corporations; control of trout-fishing had been given to individuals, two hundred yards into navigable tide-water; a corporation had been allowed to control a zone of forty rods round an island; the right to build weirs in tide-water had been given to individuals or to companies. A bill which embodied the spirit of this legislation, regulated and set in order, was offered by the Commissioners, under the name of an Act

for encouraging the cultivation of useful fishes. It was received in the legislature with mingled surprise and opposition, because the matter was quite new, and because the manufacturers feared the clauses which related to fishways and river pollutions. At first it was buried in amendments, and only emerged towards the end of the session, when it was passed to be engrossed and sent down for concurrence by the Senate, but sent up again with twenty-six amendments to its thirty-six sections. At last it was passed, and approved June 12, 1869, as an Act of thirty-four sections, whose chief points were the following :

1. Commissioners on Inland Fisheries to be three, serving five years.
2. They may enforce fishery laws, enter on private property, and cause fishways to be built.
3. May take fish at any season.
4. Riparian proprietors control all flowage ponds, and other ponds which do not exceed twenty acres.
5. Commissioners may, for the public good, lease ponds exceeding twenty acres for fish-culture.
6. For the purpose of the Act, no tidal stream shall be considered navigable above where the channel is forty feet wide and four deep.
7. The governor may limit or prohibit fishing in certain streams, and may define their mouths and tidal bounds.
8. A riparian proprietor may inclose a stream (leaving passage for migratory fish) ; fishes by him cultivated shall be his property, and be protected by penalties ; and he may take such fishes when he pleases, but may not sell them for food at unlawful seasons.
9. No one shall use a mesh of less than five inches, in the chief rivers, from April 15 to December 15 ; nor use sweep seines so as practically to bar a river ; nor bar a waterfall with a salmon-pot ; nor take salmon, shad or alewives (certain streams excepted) on any day but Monday, Wednesday, Friday or Saturday ; nor take any fresh-water fish except eels and pickerel, otherwise than by hook and line, dip-net, sweep-seine, or salmon-pot (trout only by hook and line) ; nor take salmon between August 1 and May 1 ; nor trout between September 20 and March 20 ; nor shad from June 15 to March 1 ; nor black bass from December 1 to June 1, or at any time otherwise than with hook and line ; nor smelts and white perch from March 15 to June 1, except by hook and line.
10. Officers of markets must report offenders.
11. Prosecutions must begin within four months, and one-half the fine shall go to the complainant.

The principal points omitted during the passage of the Act were :

1. The commissioners shall have authority to stop the discharge of pollutions by factories into streams or ponds.
2. No one shall injure a fishery previously existing by polluting the water.
3. No one, at an illegal season, shall *have in his possession* interdicted fish.

The first point was wisely struck out, because the power to stop

pollution is too extensive and too complex for fishery commissioners to hold. The second point, touching injury to previously existing fisheries, might well have stood. The omission of the third point, which forbade any one to have illegal fish in his possession, was a *capital error*, and one which paralyzed this side of the Act. Nobody can go to a market and prove that certain fish were taken *within the Commonwealth*. Practically, therefore, fishmongers may sell illegal fish, and affirm that they came from another State, *albeit that very State makes their sale illegal at the same season*.

For smelts, the Act has been properly amended, and smelts disappear from the market at the illegal season. The same amendment should obtain for trout and other important fishes.

1869.

In the autumn of 1868, the Commissioners established a small hatching-house at Maple Spring, in Wareham. Mr. S. T. Tisdale gave the ground, and contributed towards the building, and to the time of his death, the year after, continued to interest himself in the undertaking. During the two seasons of its operation there were hatched over 30,000 fishes, the majority of which were salmon, trout, St. Croix land-locked salmon, and lake trout (*Salmo toma*). Daily observations of the temperature of water and air were recorded, and there appeared thence a fact which seems never to have been explained; namely, that the temperature of spring-water *falls before a storm*, without regard to the rise or fall of the surrounding air. Thus, on November 20, 1868, the air *rose* 1°, and the water *fell* 5°. This fall was immediately followed by the greatest gale of the year. Similar phenomena were noted both in 1868 and 1867. Besides establishing by experiment the best conditions for hatching and the care of young, observations were made on the embryos. The rate of the heart was ascertained, and the possibility of stopping its action by cold and reëstablishing it by heat. Prof. Agassiz discovered a caudal heart under the terminal bend of the vertebral column, which had its maximum activity during the two weeks following hatching. Its pulsations do not coincide with those of the heart proper. There were given figures of a trout embryo and one of a salmon, to show the distinction of form of the yolk-sack; egg-shaped in the former, long and posteriorly pointed in the latter. For contrast, there was also presented an embryo of the common perch, and its movements and mode of life were compared with those of the salmonoids. Since the closing of the Wareham hatching-house, a small and simple establishment has been put up at Winchester, and all hatching needed by the State, including that of a large number of salmon, has been there conducted under the supervision of Mr. E. A. Brackett.

This year one of the Commissioners, Mr. Lyman, took up the vital subject of the possible exhaustion of sea-fisheries. From the earliest times, laws had been passed in this colony to prevent the decrease of fish. Already, in 1670, a supposed diminution of mackerel led to an Act for their protection, and there have since been, from time to time, attempts to control by enactment the method and season of capturing fish. A good part of these enactments were based, not on solid information, but on the beliefs of individuals or of small communities. Whenever legislative committees undertook to investigate the general question, there was little more than the negative result of a total want of proper facts. Nor was there more light in other countries. In 1865, an English commission, appointed to investigate the state of the sea-fisheries, made a voluminous report, whose conclusion was that no kind of fishing essentially diminished the supply of sea-fish. This declaration called forth strong criticisms, and especially from two French writers, Rimbaud and Berthelot, who showed pretty conclusively that the system of investigation pursued by the English commission was nearly worthless, consisting as it did in taking a vast amount of testimony from ignorant and exasperated fishermen, and thence drawing conclusions. The reliable facts were very few, and not at all enough to base any general reasoning; and it did not appear that the commissioners made any personal examination of the fisheries themselves. Rimbaud went on to draw some essential distinctions, which the English commission had ignored. He called attention to the following *groups* of fishes, as marked by their *numbers* and *habits*: 1. The *wandering* or schooling fishes, which come and go in vast armies, and journey considerable distances, such as the tunny, the mackerel, the herring and the cod. 2. The *white fishes*, or local surface-swimmers, which are in groups more or less localized, and which swim habitually in the middle or upper water. They are often clad in pearly scales, are not usually affected by the tint of the bottom, and therefore are called "white." Such are striped bass, mullet and scup. 3. *Bottom fishes*, which are localized like the preceding, but which especially keep on the bottom, or feed among the weedy rocks. Some of them are white on one side and dark on the other, like turbot and flounders; others, as the sea-perch and tautog, are variously tinted, according to the ledges they frequent. To the first of these three groups only does the conclusion of the English commission apply. The second and third groups may be diminished by excessive fishing, and still they were included by that commission under the general term "fish." And here it is well to note that an answer to the question for each species and for each locality is a matter of *mere fact*, and not of theory or inference at all. The case may thus

be presented. It is known that certain fishes, in certain places, by certain means, may be exterminated: salmon, in rivers, by dams; smelts, in brooks, by netting. Again, it is known that certain fisheries, though diligently pursued for centuries, do not exterminate the fish: the tunny-fishery of the Mediterranean; the cod-fishery of the great northern banks. The question, then, is this: Between a destructive and a not destructive fishery, where is the dividing line? This question of questions must not be answered in the lump, but for each species and for each locality, the facts must be known. To get these facts is always difficult, sometimes impossible. Suppose the problem was to ascertain whether striped bass (*Labrax lineatus*) had diminished. To satisfy this, five conditions would be needed, namely: Can [1] the same number of men [2], in the same time, [3] on the same ground, with [4] the same gear, catch [5] the same number of fish *now* that they *formerly* could? Plainly, two means would be employed to solve the problem: first, all historical data would be collated; secondly, the species of fish and the localities having been grouped, an experiment would be made to determine the conditions of each group. The following experiment, carried out for a single locality by the Commissioners in 1871, will illustrate the method. Waquoit Bay is a shallow, irregular, land-locked, many-lobed fiord, having at its upper end influent brooks, and communicating at its lower end with the sea by a very narrow passage through a sand barrier. Five hundred yards to the west of this passage, a weir projects 1,400 feet into the sea, and apparently stretches across the line of approach of the alewives, which are said to come, in spring, from the westward. Complaint was made that this weir caught the alewives that were seeking to run into Waquoit Bay, in order to enter the brooks at its head, and thus pass into ponds where they spawned. The complaint seemed so reasonable and consistent as scarcely to need proof; and, partly because the case promised to be simple, the Commissioners hired the weir for one season, and put a man in charge who kept a daily record of fish taken, and of temperature of air and water. The result was this: first, that about four times as many alewives passed into the brooks at the bay's head as were captured in the weir outside the mouth of the bay; secondly, that, of the alewives that sought the brooks, none were taken by the weir on their passage from the sea into the bay. In other words, the proved result was diametrically opposed to the untried theory. So far so good; but if we should therefore affirm that *another* weir, situated outside another bay, did not stop alewives, we might find ourselves mistaken. In view of this experiment, it is not strange that any attempt (in advance of investigation) to denounce and prohibit certain sorts of fishing must fail for want

of proof. Such an attempt was the great petition of 1870 to the legislature, asking that pounds, purse-seines, etc., be abolished. In speaking on the report of leave to withdraw, Capt. N. E. Atwood, chairman of the Committee on Fisheries, gave very interesting facts from his long experience as a fisherman and an ichthyologist, and, at the same time, contributed all that could be said in favor of free fishing. He called attention to certain great variations in fishes, apparently without the interference of man. The disappearance of *Scomber Dekayi*; the decrease of halibut; the increase of haddock, squeteague (*Otolithus regalis*), and Spanish mackerel (*Cybius maculatum*). He illustrated the vast fecundity of fishes, and set forth the extent of their feeding-grounds. In conclusion, he very properly opposed a general prohibitory Act, although he declared himself in favor of any local legislation that might prove needful. After all, he could speak only in generalities, for the hearing on the petition afforded just the same crude mass of contradictory testimony that appeared on a larger scale in the English investigation already referred to. The investigation by the state committee of Rhode Island, in 1870, brought out some reliable facts, because the space to be investigated (Narragansett Bay) was limited, and only one fish, the scup (*Pagrus argyrops*), was of chief importance. The diminution of this fish was admitted by all parties. The causes alleged were four: 1. Impurities in the water. 2. Want of food. 3. Traps or weirs. 4. Blue-fish (*Temnodon saltator*). The first two were absurd, and went down on slight investigation. The last two were solid and important. It appeared that the blue-fish went away in 1764 and came back in 1830, to find the scup abundant; and the two lived side by side for more than thirty years, without any diminution of the latter fish. It further appeared that scup greatly diminished as soon as traps became numerous, about the year 1864. Therefore, there seems no escape from the conclusion that the real agents in the destruction of this species have been traps which take them by thousands of barrels, when, torpid with cold and heavy with spawn, they are crowded by tides and currents against certain points of the coast. Such was the conclusion entertained by Mr. Lyman, in 1871, as the only probable one, and the investigations of Prof. S. F. Baird, the United States commissioner, from 1871 to 1875 inclusive, have confirmed it.

This brief sketch may serve to show that powerful engines, like weirs, pounds, and traps, require regulation, but *not such regulation as a general statute gives*; for then a harmless pound might be seriously curtailed, while another, that was destructive, might be insufficiently controlled. Each pound should be viewed in two ways: first, as an engine to be encouraged, because it furnishes large sup-

plies of food ; secondly, as an engine to be wisely limited, whenever it becomes a monopoly, or is destructive. Most pounds are now out-laws ; mere marine squatters. They should be placed on a legal footing, and have their rights and their obligations. To this end they should be placed under control, either of the Commissioners or of some other state officer.

1870.

The provision for leasing of great ponds by the State, under section 9 of the Act for encouraging the cultivation of useful fishes, began to attract attention, and seven ponds were thus leased during the year. There have been leased to January 1, 1875, thirty-seven ponds. Of late much more interest has been exhibited, and the number of applications during the past year has been large.

1871.

There was given, in an Appendix, a collection of colonial and state laws on inland fisheries from 1623 to 1871 inclusive.

1872.

Prizes for piscicultural establishments were awarded by the Massachusetts Society for Promoting Agriculture : the first, \$300, to Messrs. Bacon, Dexter and Coolidge, of West Barnstable ; the second, \$200, to Mr. D. H. Gilbert, of Plymouth. In the appendix of the report was given the water acreage of the State, by towns showing a total of nearly 200,000 acres.

1873.

In this report was a plate of the improved Foster fishway ; and, in the report for 1874, a similar plate of the fishway at Holyoke, with the improved top-hamper of Mr. E. A. Brackett.

In an appendix was given a treatise, by Mr. Livingston Stone, on the Sacramento salmon (*Salmo quinnnet*), the eggs of which he has taken in large quantities, and sent across the continent. Many of them have been hatched in the state establishment, making the seventh species of the genus. The others were *Salmo fontinalis*, *S. salar*, *S. toma*, *S. umbla*, and the St. Croix and the Sebago land-locked salmons.

The doings of 1874 have been related in treating of preceding years. Those of 1875 will be found in the present Report.

To sum up : the Commissioners on Inland Fisheries, during the ten years of their existence, have not been a costly board, and, in especial, the item of salaries has been a very small one. They found the people of this State profoundly ignorant about shore and river

fisheries, and as apathetic as ignorant. To-day the people are instructed in the matter, and are thoroughly aware of its importance. By careful experiments, and by wise legislation, our fisheries are already improved. Shad in the Connecticut, and smelts all along our coast, have been restored to their former abundance. The crop of alewives has been much increased; black bass have been spread in the chief waters of the Commonwealth; half a dozen species of trout and salmon have been bred and placed in proper streams; a great number of ponds have been leased and stocked; the law of dams and of fishways has been established by the highest courts; and, finally, the diminution of our shore fisheries has been proved, and its cause and remedy pointed out. This last investigation is alone worth all the expense and labor of the commission.

Most important of all is the general and healthy growth of *public interest* in pisciculture,—not here alone, but in the whole country. When, in 1865, the late Judge Henry A. Bellows began his advocacy of fish-culture with so much faith, it seemed most unlikely that, within a year, commissioners would be appointed for each of the New England States; that, within six years, a commissioner would be sent by the general government, armed with power and means thoroughly to investigate the entire subject of fisheries; and that, within ten years, New York, New Jersey, Pennsylvania, Maryland, Virginia, Alabama, Ohio, Michigan, Iowa, Minnesota and California, would likewise have their commissions actively engaged in restoring or in preserving their waters.

A great deal is yet to be learned; but we are on the good road to find out how many fish may be taken, and leave enough for seed.

[D.]

In view of the alarming and rapid decrease of our shore fishes, as set forth in Appendix C, the Commissioners on Inland Fisheries beg leave to call the serious attention of the general court to the following proposed Bill :—

A BILL to regulate the Use of Stationary Apparatus in the Capture of Fish.

SECTION 1. The commissioners on inland fisheries are hereby empowered to license individuals and corporations to erect, establish and use, in the waters of this Commonwealth, whether navigable or unnavigable, fixed nets, traps, pounds, pots, fykes, weirs, or other stationary apparatus, for the purpose of capturing fish, upon application for such license duly made as hereinafter conditioned and provided.

SECTION 2. All persons seeking such licenses shall make written application to said commissioners, specifying the locality in which they desire to use stationary apparatus as aforesaid, the exact character of the said apparatus, together with all details and particulars necessary for an exact understanding of said apparatus ; and upon examination of such applications, and after public hearing, if they deem necessary, the said commissioners shall grant the license desired, provided the application be made on or before the first day of March in each year, subject to the conditions hereinafter mentioned, it being understood that parties last in lawful possession of any fishing-station shall have preference in its assignment, unless barred by a violation of this act.

SECTION 3. The license shall be in writing, signed by a majority of said commissioners, and shall state clearly the locality within which the same shall have effect ; and no license shall have effect in any locality other than that mentioned and described therein, and shall prescribe the nature of such stationary apparatus, and such other limitations and directions as said commissioners shall deem proper ; and no license shall take effect until the same shall be left for record with the clerk of the town or city within which the same is to have effect, nor until the recording fee of said clerk, being the same as that established by law for recording mortgages of personal property of equal length, shall be fully paid.

SECTION 4. The said licenses may embrace any period not exceeding one year ; but, whenever given, they shall expire on the first day of January next following their date ; and the clerk of each city or town in which said licenses have been recorded shall, on the first day of April in each year, make return to said commissioners of the said licenses then in force, and the localities to which the same relate.

SECTION 5. Every person who shall have received a license in the manner herein provided shall, before the first day of January following the date of said license, make accurate return to said commissioners of the numbers and the kinds of fish captured by him, during each day of the season, by virtue of said license, and shall furnish accurate information of all other facts relating to said license which said commissioners may require ; and no license shall be renewed until said report shall have been made to the satisfaction of said commissioners.

SECTION 6. No person enjoying such license shall take, or allow to be taken, any fish by means of stationary apparatus by him used, from the twentieth day of April until the fifteenth day of June in each year, in the interval of time between the hours of six o'clock on Friday evening and six o'clock on the following Monday morning ; and every person enjoying such license shall comply with any and all regulations made by the commissioners for the purpose of allowing and securing an unobstructed passage of the fish through or by the apparatus in question during the time specified.

SECTION 7. No license granted under the provisions of this act shall be construed as authorizing the grantee of the same to enter upon the land of individuals without their permission, nor to interfere, in any way, with private property.

SECTION 8. Whoever sets or uses, or causes to be set or used, in the waters of this Commonwealth, whether the same are navigable or unnavigable, any weir, pot, pound, yard, trap, or other stationary apparatus whatsoever, for the purpose of capturing fish, except by virtue of a license duly issued, and for that particular locality, under the provisions of this act, shall forfeit and pay for each day during any part of which said apparatus is so set or used, a sum not less than fifty dollars nor more than one hundred dollars, and shall forfeit all apparatus so used, including nets, stakes, boats, and so forth, which shall be sold, and the proceeds of such sale placed in the treasury of the Commonwealth.

SECTION 9. Whoever, having received a license under the provisions of this act, shall neglect or refuse to comply with the provisions of the same, or of his license, shall forfeit and pay for each offence a sum not less than fifty dollars nor more than one hundred

dollars, except that in case of his violation of section six of this act he shall forfeit and pay for each day during any part of which his offence is committed, a sum not less than fifty dollars nor more than one hundred dollars, and shall forfeit all apparatus used in violation of said section, which shall be sold, and the proceeds of such sale be placed in the treasury of the Commonwealth.

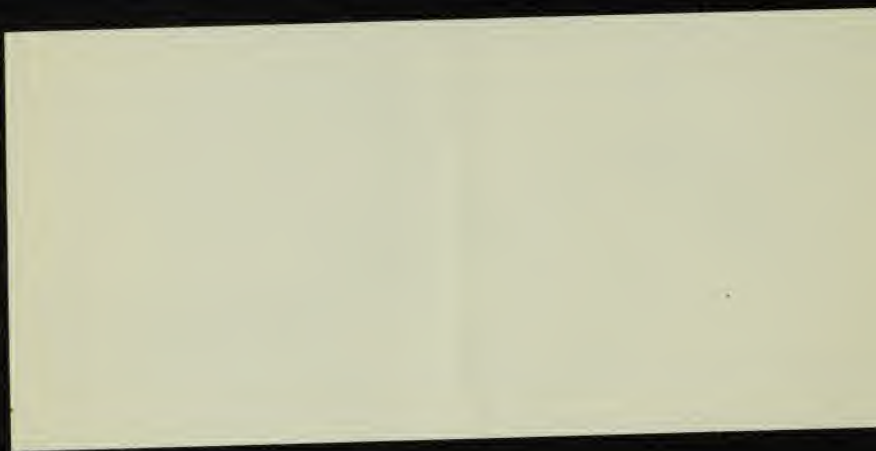
SECTION 10. All actions and prosecutions under this act shall be commenced within six months after the offence is committed, and one-half of the fine or penalty recovered in any action or prosecution aforesaid shall be paid to the person who shall first bring an action of tort therefor, in his own name, or shall make complaint in any criminal case, and the remaining half in either case shall be paid into the treasury of the Commonwealth.

SECTION 11. No apparatus for capturing fish shall be set in such manner or in such place as to obstruct reasonable navigation with boats or vessels; but no one shall be permitted wantonly to destroy fishing apparatus lawfully set and managed, and for which the required license has been given, under penalty of not less than fifty nor more than five hundred dollars, to be recovered as aforesaid.

SECTION 12. This act shall take effect from and after its passage.

COMPLIMENTS OF

E. A. Brackett.



ELEVENTH ANNUAL REPORT

OF THE

COMMISSIONERS

ON

INLAND FISHERIES,

FOR THE

YEAR ENDING JANUARY 1, 1877.

BOSTON:

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1877.

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Commonwealth of Massachusetts.

To His Excellency the Governor and Honorable Council.

The Commissioners on Inland Fisheries beg leave to present their Eleventh Annual Report.

FISHWAYS.

Holyoke.

An appropriation was made by the last Legislature for improvements on the Holyoke and Lawrence fishways. A small wing-dam, over thirty feet long, was built two years ago at the foot of the Holyoke pass for the purpose of checking the fish in their passage up the river, and enabling them the more readily to find the mouth of the way, the effect of which was so favorable that it was decided to extend it into the river about seventy-five feet. The freshet of last spring piled the ice on the Holyoke dam fifty feet high, and when it broke away, it not only carried off the small dam, but materially injured the lower part of the fishway. A much larger and more complete structure has been built this summer in place of the one destroyed, so arranged that gratings can be placed upon it, and the fish turned directly to the mouth of the way. The work has been done by the day, in a most thorough and substantial manner, and at much less cost than any estimate which could be obtained. The openings have been enlarged from twenty-four to thirty inches, and the fishway otherwise greatly improved.

Lawrence.

The top hamper of this pass has been altered so as to resemble that of the Holyoke. The grade of the way was one foot in ten, and could not be altered without involving great expense; while that of the Holyoke, which works so

well in its slow current and even flow of water, is one foot in fifteen.

Some apprehensions were felt that this sharp grade might possibly develop difficulties not easily overcome, and to meet this the way was made two feet six inches deep instead of two feet, with capacity for greater depth if required, without further outlay. The result showed that the objections had been fully met, and the current was sufficiently slow to admit of the easy passage of all kinds of fish. All the smaller species passed freely over the old fishway, and this year alewives have been taken in considerable quantities in several places between Lawrence and Manchester.

No shad have been seen at the dam this season, which is undoubtedly owing to the excessive fishing and total disregard of law on the part of the fishermen below. At Holyoke, the damage done to the lower part of the fishway was such that it was scarcely to be expected that the shad could find their way to it, and the repairs could not be made until low water, at which time the fish would have ceased to run. The superintendent reported that he had not seen any shad in the way, but subsequent information received from several places on the river above the dam showed that it was not the fault of the shad that he did not see them. Later in the season, while drawing off the water for repairs at the paper mill, a full-sized shad was found in the canal just above the fishway. Mr. Charles C. Smith, one of the owners of the seining ground at South Hadley, has reliable informations of six large shad taken just below Greenfield.

Whatever of interest or advantage may accrue to the people of this State from the successful working of the Holyoke and Lawrence fishways, it should be borne in mind that these expensive structures have been built to satisfy the demands of New Hampshire and Vermont, we having by insurmountable dams deprived them of migratory fish. Of the justice of their claims there appears to be no question, and now that the work has been done in such a way that leaves little or no doubt of success, no obstacle should be allowed to stand in the way of thoroughly testing it.

At the close of this Report will be found the amount expended on these two fishways. The Essex Company contrib-

uted \$500 toward the Lawrence fishway, without which the work could not have been completed this year.

Westfield River.

The negotiations with the Agawam Canal Company have resulted in an agreement on their part to build a fishway over their dam. A copy thereof is here submitted:—

“To E. A. BRACKETT, *Fish Commissioner.*

“The Agawam Canal Company hereby agree to build a fishway, according to plans to be furnished them by your Board, free of expense or cost, and agree to have the same completed on or before the first day of September, 1877, unless your Board are willing for any cause to extend the time beyond said 1st of September.

“THE AGAWAM CANAL COMPANY,

“BY WM. K. BAKER, *Treasurer.*

“E. TRASK,

“J. H. SOUTHWORTH,

“JAMES KIRKHAM,

“JAS. D. BREWER,

“HENRY FULLER, Jr.,

“*Majority of the Board of Directors.*

“SPRINGFIELD, MASS., July 29, 1876.”

Palmer's River.

Plans and specifications have been furnished the Orleans Company at Rehoboth for a fishway over their dam, and Mr. C. R. Cutler, treasurer, has responded in a very friendly note, giving the assurance that the work will be completed before the time for the fish to run next spring. There is a fine pool just below this dam, where the shad congregate in large numbers; we are informed that as many as seven hundred have been taken here in one day. If the people interested in the fisheries on this river will attend to their duty and see that a law is passed protecting the fishways, and will for a few seasons put shad above the dam, a large increase may be obtained, otherwise the way will be useless. In all applications hereafter made for opening streams and rivers to the passage of fish, whether by petition or vote of towns, we shall require assurance to be given by the applicants that *their* part of the

obligations will be strictly complied with before we subject the mill-owners to the expense of building fishways.

Saugus River.

The town of Wakefield, by a unanimous vote, requested that the Commissioners should cause fishways to be built over the dams on this river. Assurance being given that if it was opened it would be restocked on the last of July, a careful examination was made of the whole length of the river. Formerly it was well stocked with shad and alewives. A few alewives still run up as far as the Scott's mills; the two dams below being tide-mills offer little or no impediment to their passage. The river, though small, is a fine one, capable of sustaining a large number of fish. Notice has been given to the owners of dams to put in ways. All fishing should be suspended for four or five years to enable the river to be restocked.

Squabetty Dam.

The towns above this dam have taken steps to stock their rivers and streams with the larger migratory fish, many thousand shad having been put in at Bridgewater and Middleborough during the past season. Some changes will be needed at this dam the coming season.

Monatiquot River.

In 1872-3, fishways were built over nine dams on this river. Of migratory fish, a few smelt and alewives only ran up as far as the first dam at Hobart's mills.

In 1873, several thousand shad spawn were put into hatching-boxes in the upper part of the river. The parties having charge of them reported that the eggs all died. As they were all in good condition when put in the hatching-boxes, the statement was doubted, and subsequent investigation rendered it pretty certain that a large per cent. hatched, and the young passed through the wire-screens in the bottom of the boxes. The following extract, from a letter written by Mr. Eben Denton of Weymouth, is interesting as showing not only the large increase of smelts and alewives, but also that the shad spawn which was reported dead has been the means

of stocking the river, and that the mature fish returned in three years from the time they were hatched:—

“WEYMOUTH, November 27, 1876.

“MR. E. A. BRACKETT.

“MY DEAR SIR:—As far as my knowledge of the matter extends, I can say that all the fishways are in good condition, except that the second—N. L. White’s—is passable only at high stages of the river. With an ordinary quantity of water running, the upper end of the passage is dry, caused by the many breaks and leaks in the old and unused dam. Still, many fish must have passed over, for they were seen *above* the sixth dam, but none were seen at or near the tenth and last dam, and none consequently entered the pond. There is an obstruction somewhere below the tenth dam.

“The number of fish in the river at the spawning season was *very great*; not only alewives in shoals, but smelts in immense numbers, and many shad, were seen; at least *one* shad was taken, which shows that the eggs hatched in 1873 were not *all dead*, as stated. As the law now stands relating to fisheries on this river, the fish cannot be protected from trespass, and unless a new Act is passed this winter by the Legislature, fishing will be practically free to all, and the usual consequences may be predicted.

“I remain, very truly yours, etc.,

“EBEN DENTON.”

ALEWIVES (*Alosa tyrannus*).

The reports on alewives have been variable; in some places the run has been large, in others quite small. These fish are so productive and so easily bred that it is the merest folly not to keep them up to the desired number. Something cannot come of nothing, and if persons having charge of these fisheries will insist upon keeping the number of parent fish below what is required to keep up the stock, they have nothing to blame but their own mismanagement. In nine cases out of ten it is useless to attribute the falling off to anything else.

The lateness of the spring or temperature of the water may *retard* but does not *prevent* migratory fish returning to where they were bred to deposit their spawn. All theories about their leaving the waters where they belong and going up other rivers and streams, are in direct violation of the laws governing all such fish; it never occurs except where

they are suddenly shut off from their spawning grounds by impassable dams, and even here such cases are very rare. There is scarcely a stream in the State stocked with alewives that could not, with care, in a few years, be made to produce tenfold its present returns.

SHAD (*Alosa præstabilis*).

The catch on the lower part of the Connecticut has been remarkably fine; probably in no year since the river has been fished has it been so large. The fishermen on that part of the river, with their pounds, gill-nets and seines, have left but a meagre supply for this State. The hatching at South Hadley was run in the interest of the United States Commission, with the understanding that a certain percentage of the fry should be put in above the Holyoke dam, and all unripe fish returned to the river alive. In consequence of the high temperature of the water and the scarcity of mature fish, the result was almost an entire failure. This, of course, could not be helped; but it was rendered still more unfortunate by the destruction of all the unripe fish, instead of putting them back to be used when matured.

In accordance with the suggestion made in last year's report, the hatching at North Andover was discontinued for this year. It is probable that had the effort been made, the same difficulties which occurred at South Hadley would have more or less affected the operations at this place also.

But few returns have been made by the fishermen of the Merrimac; enough, however, has been reported by those who complied with the law to show that the run has been large. It would require no great amount of foresight to predict with a good deal of certainty that in the next three or four years there will be a decided falling off of the shad fisheries in both these rivers.

SALMON (*Salmo salar*).

Four hundred and fifty thousand salmon spawn were received last January from the Bucksport salmon hatching establishment, in excellent condition, hatching with a loss of about one per cent. Some two hundred thousand of these eggs were presented by Professor Baird, United States Com-

missioner, with the understanding that they were to be put, when hatched, into the tributaries of the Merrimac for the benefit of both States; and it was supposed that if this State bore all the expenses of hatching and caring for them till ready to be turned out, the New Hampshire Commission would be more than glad to take them to the headwaters of the Merrimac. Notice was sent to Mr. Oliver H. Noyes, Chairman of that Commission, that the fish would be ready about the middle of May, and were at his disposal. He replied in a very friendly note, stating that the position in which he was placed compelled him to decline the offer. This fact becoming known to Mr. John McNeil, formerly of Hillsborough, N. H., he at once volunteered to take charge of the fish and relieve the Commission from any expense in the distribution. Much credit is due Mr. McNeil for his disinterested devotion to the work under trying circumstances, the thermometer often running above ninety degrees during the transportation. Through his care and good judgment, the four hundred thousand young salmon were put into the headwaters of the Merrimac in excellent condition.

WINCHESTER, November 8, 1876.

To the Commissioners on Inland Fisheries for the Commonwealth of Massachusetts.

GENTLEMEN :—Some time in the early part of last May, Mr. Brackett, of your Board, informed me that he had offered to the Fish Commissioners of New Hampshire four hundred salmon fry, with the view of having them deposited in the Baker and Pemigewasset rivers, tributaries to the Merrimac. His proposition was to furnish fish-cans, ice, and whatever else might be necessary for their transportation, and put them aboard the cars at Winchester, free of cost or charge to the State of New Hampshire. For some unknown reason, they declined to accept the offer. Colonel John H. George and myself being natives of that State, and feeling a deep interest in the success of this great enterprise, thought best to accept Mr. Brackett's generous proposition. John E. Lyon, Esq., President of the Boston & Montreal Railroad, becoming acquainted with the facts, offered us free transportation for fish and men to any point on that road. On the 22d of May, we commenced taking them at the rate of thirty-five thousand per day, until the whole number were deposited. The farthest northern point was in Baker's River, at Warren; the most southern point was in the Pemigewasset, at Franklin. A great majority of them were put into the Pemigewas-

set, above Livermore's Falls. The loss by transportation was comparatively nothing, hardly ever amounting to more than three or four fish in a can. Mr. Charles M. Stark of Dumbarton, N. H., and Mr. Robert R. Holmes of East Wareham, Mass., who assisted me, are entitled to much commendation for the care and fidelity with which they discharged their duty.

At the time we commenced moving the fish, Governor Cheney was absent from the State, on a trip to California. On his return, he expressed much satisfaction at what had been done, and said he would become personally responsible for the incidental expenses of the undertaking. Subsequently, the State paid the amount.

I found a good friend to the cause, and a valuable assistant, in Mr. E. B. Hodge of Plymouth, N. H., a gentleman who not only takes great interest in fish culture, but is well versed in the Canadian system of artificial propagation. He informed me that, last year; he had seen several lots of young salmon which have been caught from the Pemigewasset by tourists. Herewith I send a copy of a communication recently received from him:—

PLYMOUTH, October 26, 1876.

FRIEND MCNEIL:—In answer to yours of the 22d, asking after the salmon placed here this season by you, as far as I have been able to ascertain by personal observation, and I have devoted some little time to it, and have made inquiries of others, I am fully satisfied that, so far, the experiment has been a success, not only for this year, but for last. I have seen large numbers of the fingerlings of last year. They were, in August, about five inches in length; some were larger. They were very plenty in the Pemigewasset, and I observed a few in Baker's River. I saw, in Baker's River, in August, near the mouth of Cold Brook, several hundred of this season's fry. They were about two and one-half inches long, and seemed healthy, although they must have suffered from the high temperature of the water,—for it was warmer than it has been known for many years; but I have seen no dead fish of any kind. In September, I saw some of this year's fry in the Pemigewasset, one of which I secured with a landing-net. It was three and a quarter inches in length. Many young salmon have been taken this season by—I will not call them anglers—but “gentleman pot-hunters.” Now, don't blame the natives; for the depredators come from your State. I have done what I could to prevent it, and, in a measure, have been successful. Should nothing befall the fish this winter, the rivers will be alive with them next summer, when some measures should be taken to protect them.

Yours truly,

E. B. HODGE.

From the careful observations of Mr. Hodge, as well as the favorable reports from the inhabitants along the Pemigewasset and Baker's rivers, I feel justified in saying that the enterprise thus far is a complete success.

JOHN MCNEIL.

Ten thousand young salmon were sent to George G. Lowell of Cotuit Port, for Cotuit River, and thirty thousand to J. L. S. Thompson of Lancaster, for the Nashua River.

LAND-LOCKED, OR FRESH-WATER SALMON.

The proportion of spawn due this State from the Grand Lake hatching establishment last year was two hundred and ten thousand, from which about one hundred and ninety-five thousand young fish were obtained, and were distributed as follows:—

| | | |
|---|-------|--------|
| George L. Fessenden, for pond in Sandwich, | . . . | 3,500 |
| E. S. Merrill, for pond in Winchendon, | . . . | 3,000 |
| Cyrus Kilburn, for pond in Lunenburg, | . . . | 4,000 |
| James L. Chapin, for pond in Lincoln, | . . . | 3,000 |
| H. C. Bacon, for pond in Boxford, | . . . | 4,000 |
| N. D. Parks, for pond in Westfield, | . . . | 5,000 |
| J. N. Vinson, for pond in South Weymouth, | . . . | 3,000 |
| William H. Murray, for pond in Pittsfield, | . . . | 4,000 |
| E. C. Howard, for pond in North Sandwich, | . . . | 5,000 |
| Julius A. George, for pond in Mendon, | . . . | 3,000 |
| A. C. Brigham, for pond in South Abington, | . . . | 3,000 |
| Hollis Hunnewell, for pond in Wellesley, | . . . | 3,000 |
| J. D. W. French, for pond in North Andover, | . . . | 5,000 |
| J. L. S. Thompson, for pond in Lancaster, | . . . | 15,000 |
| J. Dwight Francis, for pond in Pittsfield, | . . . | 8,000 |
| D. E. Damon, for pond in Plymouth, | . . . | 3,000 |
| Ohio Whitney, for pond in Ashburnham, | . . . | 5,000 |
| A. M. Shaw, for pond in South Carver, | . . . | 3,000 |
| George G. Lowell, for pond in Cotuit Port, | . . . | 4,000 |
| E. H. Hartshorn, for pond in Berlin, | . . . | 3,000 |
| Henry W. Smith, for pond in Athol, | . . . | 3,000 |
| W. P. Bigelow, for pond in Natick, | . . . | 3,500 |
| Fred. W. Clapp, for pond in Framingham, | . . . | 3,000 |
| Fred. Winsor, for pond in Winchester, | . . . | 6,000 |

The Commissioners having, under the Act of 1876, taken possession of Halfway Pond in Plymouth, for the purpose of raising and distributing fish in other waters of the State, the remainder were put into this pond. There will most likely be from one to two hundred thousand of these fish for distribution next May.

The plan has been to furnish them at the state hatching-house in Winchester, free of charge, to all applicants having under their control any of the great ponds of the State. For transportation, parties should bring with them good clean half-barrels or milk-cans, holding ten or twelve gallons, a thermometer and a dipper for aerating the water. The half-barrels will carry from four to five thousand, and the milk-cans about three thousand.

The introduction of these fish into ponds having neither inlet nor outlet for them to run into, is an experiment the result of which time alone can settle. That trout will breed in such ponds, and that these salmon spawn on the shoals of Sebago Lake, is well known.

Applications should be made as early as possible, in order to determine their distribution. Many persons applied last year, after most of the fish had been sent out, and several requests came weeks after the house had been entirely cleared.

The reports from a number of ponds where they have been introduced are encouraging, indicating that they have been so far successful. That there will be failures in some instances is to be expected, but if we succeed in establishing them in one-quarter of the great ponds of the State, it will be ample reward for all the labor and money expended in their introduction.

CALIFORNIA SALMON (*Salmo quinnat*).

Of the seventy-five thousand of these fish hatched October, 1875, fifty thousand were intrusted to the care of John S. Wadleigh, Commissioner of New Hampshire, with the understanding that they should be put into Baker's River at Warren. How many of them reached their destination it is impossible to say, as no report could be obtained from him, but it is presumed that most of them were deposited according to agreement. Twenty-five thousand were put into the headwaters of North River, near Curtis's Mills.

On the 5th of last October, two hundred thousand spawn were received from Professor Baird in good condition. There was a loss of twelve thousand four hundred and forty eggs in hatching, and a still further loss of young fish may reduce

the number to be distributed in December to one hundred and eighty thousand.

It is generally understood that these fish are more active, more rapid in growth and better able to withstand the extremes of heat and cold than our Atlantic salmon. To offset these good qualities, it is stated that they never return to the sea after spawning, but die soon after depositing their eggs, polluting the water with their decaying bodies as they drift down by the hundreds of thousands. This *may* be true, and some advocate of evolution may yet be able to trace them back to that class of *insects* which perish in the effort to propagate their species.

The theory that our rivers, in consequence of cutting off the forests, have become too warm for the *salmo salar*, is not likely to be sustained by facts. The past summer was remarkable not only for its heat, but also for the unprecedented low stage of water, and, therefore, some anxiety was felt in regard to the young salmon in the upper waters of the Merrimac. They have been carefully looked after by parties familiar with the habits of these fish, and in no instance were any dead ones found, though thousands were seen all through the summer and fall apparently perfectly healthy and full of life.

From most of the sixty-eight great ponds of the State leased and stocked, reports have been received and put on file for future use. With scarcely an exception, the indications are favorable. Many of the returns are interesting, and we should have been glad to have printed them in full, but that would have added about seventy pages to the Report, which, as a matter of economy, it was thought best to avoid. Abstracts of several, from those ponds first leased, will be found in the Appendix.

The fishways at Lawrence and Holyoke are completed, and, with proper care and attention, there appears to be no reason why they should not fully answer the purpose for which they were built. Many passes have been constructed over dams in other parts of the State, and, in all cases where the new form has been adopted, have given satisfaction.

The run of alewives has been large. New streams have been opened and restocked, and the old ones, as a general rule, been managed with more skill and better judgment.

The shad have been largely increased in the Merrimac; and on the lower part of the Connecticut, the catch during the last season was better than ever before known.

The headwaters of the Merrimac are swarming with young salmon, while the full-grown fish are making their appearance in both rivers.

Some sixty-eight great ponds of the State have been stocked with black bass, land-locked salmon and other fish, and, as a natural consequence, all the streams connected therewith are getting their share.

Black bass are plenty in the upper part of the Connecticut, and are rapidly increasing in the Merrimac.

The result thus far is all that could reasonably be expected. Among the obstacles in the way of success, and which have yet to be overcome, are selfishness and lawlessness on the part of many of the fishermen. They are the only class of men who appear to be blind to the future, and rigidly practise the doctrine of taking no thought for the morrow. As the fish increase and the catch becomes more profitable, the number of seines and fishermen also increases, and the wrangling between contending parties has led to almost a total disregard of law on the Merrimac. The course here pursued, if allowed to continue, will render abortive any efforts that have been or may hereafter be made to repair the injury done to the State above. So completely has this work been carried on, that not a shad was known to reach the Lawrence dam during the past season. No complaint has been made of the fishermen in *this State* for violation of law on the Connecticut; but in the river below and at the mouth of it, the number of pounds, gill-nets and seines, together with the number of days they are allowed to be used, is producing a like result, and we most earnestly appeal to the Commissioners of Connecticut to see to it that our State, as well as the State above, is justly dealt with.

For the necessary expenses of the Commission, we recommend an appropriation of five thousand dollars (\$5,000).

THEODORE LYMAN,
E. A. BRACKETT,
ASA FRENCH,

Commissioners on Inland Fisheries.

EXPENDITURES OF COMMISSION.

| | |
|--------------------------------|------------|
| Salary, | \$1,650 00 |
| Travelling expenses, | 220 92 |
| Postage, | 29 98 |
| | <hr/> |
| | \$1,900 90 |

GENERAL EXPENSES.

| | | |
|--|----------|------------|
| Subscription to Schoodic salmon enterprise, . | \$800 00 | |
| Transportation of fish, | 352 98 | |
| Labor in state hatching-house, | 60 34 | |
| Lantern, fish-cans, etc., | 47 85 | |
| Plans and specifications, | 18 00 | |
| Printing, | 110 63 | |
| Advertising, | 29 00 | |
| Painting, | 16 50 | |
| Care of fishways, | 48 00 | |
| Lumber, labor on netting, etc., | 8 15 | |
| Rent of ground for hatching-house, | 50 00 | |
| Improvement of Lawrence fishway, | 1,906 33 | |
| Improvement of Holyoke fishway at South Hadley Falls, | 1,028 04 | |
| | <hr/> | 4,475 82 |
| | | <hr/> |
| | | \$6,376 72 |

A P P E N D I X .

[A.]

COMMISSIONERS ON FISHERIES.

UNITED STATES.

| | | | | | | |
|-------------------------|---|---|---|---|---|---|
| Prof. SPENCER F. BAIRD, | . | . | . | . | . | { Smithsonian Institution, Washington, D. C. |
|-------------------------|---|---|---|---|---|---|

MAINE.

| | | | | | | |
|-------------------|---|---|---|---|---|-----------|
| E. M. STILWELL, | . | . | . | . | . | Bangor. |
| HENRY O. STANLEY, | . | . | . | . | . | Dixfield. |

NEW HAMPSHIRE.

| | | | | | | |
|----------------|---|---|---|---|---|-------------|
| LUTHER HAYES, | . | . | . | . | . | Milton. |
| SAMUEL WEBBER, | . | . | . | . | . | Manchester. |
| ALBINA POWERS, | . | . | . | . | . | Grantham. |

VERMONT.

| | | | | | | |
|-------------------|---|---|---|---|---|-------------|
| M. GOLDSMITH, | . | . | . | . | . | Rutland. |
| Rev. WM. H. LORD, | . | . | . | . | . | Montpelier. |

MASSACHUSETTS.

| | | | | | | |
|-----------------|---|---|---|---|---|------------------|
| THEODORE LYMAN, | . | . | . | . | . | Brookline. |
| E. A. BRACKETT, | . | . | . | . | . | Winchester. |
| ASA FRENCH, | . | . | . | . | . | South Braintree. |

CONNECTICUT.

| | | | | | | |
|--------------------|---|---|---|---|---|-------------|
| WILLIAM M. HUDSON, | . | . | . | . | . | Hartford. |
| ROBERT G. PIKE, | . | . | . | . | . | Middletown. |
| JAMES A. BILL, | . | . | . | . | . | Lyme. |

RHODE ISLAND.

| | | | | | | |
|----------------------|---|---|---|---|---|-------------|
| NEWTON DEXTER, | . | . | . | . | . | Providence. |
| ALFRED A. REED, Jr., | . | . | . | . | . | Providence. |
| JOHN H. BARDEN, | . | . | . | . | . | Scituate. |

NEW YORK.

| | | | | | | |
|----------------------|---|---|---|---|---|----------------|
| HORATIO SEYMOUR, | . | . | . | . | . | Utica. |
| ROBERT R. ROOSEVELT, | . | . | . | . | . | New York City. |
| EDWARD M. SMITH, | . | . | . | . | . | Rochester. |

NEW JERSEY.

| | |
|---------------------------|-----------|
| J. R. SHOTWELL, | Rahway. |
| G. A. ANDERSON, | Trenton. |
| B. P. HOWELL, | Woodbury. |

PENNSYLVANIA.

| | |
|-------------------------|----------------|
| H. J. REEDER, | Easton. |
| B. L. HEWITT, | Hollidaysburg. |
| JAMES DUFFY, | Marietta. |

MARYLAND.

| | |
|---------------------------|------------|
| T. B. FERGUSON, | Baltimore. |
| T. DOWNES, | Denton. |

VIRGINIA.

| | |
|------------------------------|-------------|
| A. MOSELY, | Richmond. |
| Dr. W. B. ROBERTS, | Lynchburg. |
| M. C. ELLSLEY, | Blacksburg. |

ALABAMA.

| | |
|---------------------------------|-------------|
| CHARLES S. G. DOSTER, | Montgomery. |
| RO. TYLER, | Montgomery. |
| D. R. HUNDLEY, | Courtland. |

OHIO.

| | |
|-----------------------------------|------------|
| JOHN HUSSEY, | Lockland. |
| JOHN H. KLIPPART, | Columbus. |
| Dr. ELISHA T. STIRLING, | Cleveland. |

MICHIGAN.

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|------------------------------|-----------|
| ANDREW J. KELLOGG, | Allegan. |
| GEO. CLARK, | Ecorse. |
| E. R. MILLER, | Richland. |

IOWA.

| | |
|------------------------------|-----------|
| SAMUEL B. EVANS, | Ottumwa. |
| B. F. SHAW, | Anamosa. |
| CHARLES A. HAYNES, | Waterloo. |

MINNESOTA.

| | |
|--------------------------|------------|
| A. W. LATHAM, | Excelsior. |
| R. O. SWEENEY, | St. Paul. |
| HORACE AUSTIN, | St. Paul. |

CALIFORNIA.

| | |
|-------------------------------|----------------|
| B. B. REDDING, | Sacramento. |
| S. R. THROCKMORTON, | San Francisco. |
| J. D. FARWELL, | San Francisco. |

DOMINION OF CANADA.

W. F. WHITCHER, Ottawa.

ARKANSAS.

N. H. FISH, Pine Bluffs.
 J. R. STEELMAN, Little Rock.
 N. B. PEACE, Fayetteville.

WISCONSIN.

A. PALMER, Boscabel.
 WILLIAM WELCH, Madison.
 P. R. HOY, Racine.

UTAH TERRITORY.

A. P. LOCKWOOD, Salt Lake City.

KENTUCKY.

P. H. DARBEY, Caldwell County.
 POLK LAFFOON, Hopkins "
 Dr. S. W. COOMBS, Warren "
 Hon. C. J. WALTON, Hart "
 PACK THOMAS, Jefferson "
 Hon. JAMES B. CASEY, Kenton "
 Hon. JOHN A. STEELE, Woodford "
 J. H. BRUCE, Garrard "
 Gen. T. T. GARRARD, Clay "
 W. C. ALLEN, Bath "

[B.]

LIST OF PONDS LEASED

*By the Commissioners on Inland Fisheries, under authority given by
Chap. 384, Sect. 9, of the Acts of 1869.**

1870.

- Feb. 1. Waushakum Pond, in Framingham, to Sturtevant and others, 20 years.
- Mar. 1. Tisbury Great Pond, in Tisbury and Chilmark, Allen Look and others, 10 years.
- Apr. 1. Chauncey Pond, in Westborough, to Trustees Reform School, 5 years.
1. Mendon Pond, in Mendon, to Leonard T. Wilson and another, 20 years.
- June 20. Silver Lake, in Wilmington, to Charles O. Billings and others, 20 years.
- Sept. 12. Baptist Lake, in Newton, to J. F. C. Hyde and others, 20 years.
- Oct. 15. Archer's Pond, in Wrentham, to William E. George, 15 years.

1871.

- Jan. 10. Nine Mile Pond, in Wilbraham, to B. F. Bowles, 10 years.
30. Little Pond, in Falmouth, to F. H. Dimmick, 10 years.
- Apr. —. Spectacle, Triangle, and Peter's ponds, in Sandwich, to G. L. Fessenden and another, 5 years.
17. Long Pond, in Falmouth, to Joshua S. Bowerman and three others, 20 years.
- May 15. Pratt's Pond, in Upton, to D. W. Batcheller, 20 years.
18. Little Sandy Pond, in Plymouth, to William E. Perkins, 15 years.

* We would remind lessees of ponds that they are required, by their leases, to use all reasonable efforts to stock their ponds and keep accurate records of the same, and make returns of their doings to the Commissioners on the *first of October*, each year, of the number and species of fish which they have put in or removed from their ponds. Any failure to comply with these conditions is a breach of contract invalidating their lease. It is important that the State should know just what is being done; and, where there appears to be mismanagement, or apparent failures, the Commissioners will visit the ponds, and ascertain, if possible, the cause.

1871.

- Nov. 1. Punkapoag Pond, in Randolph and Canton, to Henry L. Pierce, 20 years.

1872.

- Jan. 1. Sandy Pond, Forest Lake, or Flint's Pond, in Lincoln, to James L. Chapin and others, 20 years.
Apr. 1. Onota Lake, in Pittsfield, to William H. Murray and others, 5 years.
July 20. Little Pond, in Braintree, to Eben Denton and others, 20 years.

1873.

- May 1. Meeting-house Pond, in Westminster, to inhabitants of Westminster, 15 years.
1. Great Pond, in Weymouth, to James L. Bates and others, 15 years.
July 1. Little Sandy Pond, in Pembroke, to A. C. Brigham and others, 16 years.
Sept. 1. Pontoosuc Lake, in Pittsfield and Lanesborough, to E. H. Kellogg and others, 15 years.
Oct. 1. Farm Pond, in Sherborn, to inhabitants of Sherborn, 15 years.
1. Spot Pond, in Stoneham, to inhabitants of Stoneham, 15 years.
Nov. 1. Lake Chaubunagungamong, or Big Pond, in Webster, to inhabitants of Webster, 5 years.
Dec. 1. Lake Wauban, in Needham, to Hollis Hunnewell, 20 years.

1874.

- Mar. 1. Walden and White ponds, in Concord, to inhabitants of Concord, 15 years.
2. Upper Nankeag, in Ashburnham, to inhabitants of Ashburnham, 20 years.
Apr. 1. Elder's Pond, in Lakeville, to inhabitants of Lakeville, 15 years.
20. North and South Podunk ponds, in Brookfield, to inhabitants of Brookfield, 15 years.
May. 2. Brown's Pond, in Peabody, to John L. Shorey, 15 years.
1. Maquan Pond, in Hanson, to the inhabitants of Hanson, 15 years.
16. Wickaboag Pond, in West Brookfield, to Lemuel Fullam, 15 years.
20. Unchechewalom and Massapog ponds, to the inhabitants of Lunenburg, 20 years.
July 1. Hardy's Pond, in Waltham, to H. E. Priest and others, 15 years.

1874.

- July 1. Hockomocko Pond, in Westborough, to L. N. Fairbanks and others, 15 years.
11. Mitchell's Pond, in Boxford, to R. M. Cross and others, 15 years.
11. Hazzard's Pond, in Russell, to N. D. Parks and others, 20 years.
- Oct. 1. East Waushacum Pond, in Sterling, to inhabitants of Sterling, 20 years.
20. Middleton Pond, in Middleton, to inhabitants of Middleton, 15 years.

1875.

- Jan. 1. White and Goose ponds, in Chatham, to George W. Davis, 15 years.
- Mar. 1. Lake Pleasant, in Montague, to inhabitants of Montague, 10 years.
1. Hood's Pond, in Ipswich and Topsfield, to inhabitants of Topsfield, 15 years.
- Apr. 1. Chauncey Pond, in Westborough, to inhabitants of Westborough, 15 years.
3. West's Pond, in Bolton, to J. D. Hurlburt and others, 15 years.
15. Gates Pond, in Berlin, to E. H. Hartshorn and others, 15 years.
24. Pleasant Pond, in Wenham, to inhabitants of Wenham, 15 years.
- May 1. Morse's Pond, in Needham, to Edmund M. Wood, 15 years.
1. Great Pond, in North Andover, to Eben Sutton and others, 20 years.
1. Chilmark Pond, in Chilmark, to J. Nickerson and others, agents, 20 years.
- July 1. Winter Pond and Wedge Pond, in Winchester, to inhabitants of Winchester, 15 years.
1. Haggett's Pond, in Andover, to inhabitants of Andover, 20 years.
- Aug. 1. Oyster Pond, in Edgartown, to J. H. Smith and others, 20 years.
7. West Waushacum Pond, in Sterling, to inhabitants of Sterling, 20 years.
9. Mystic (Upper) Pond, in Winchester, Medford, and Arlington, to inhabitants of Winchester and Medford, 15 years.
- Oct. 1. Little Chauncey and Solomon ponds, in Northborough, to inhabitants of Northborough, 15 years.

1876.

- Feb. 1. Great Sandy Bottom Pond, in Pembroke, to Israel Thrasher and others, 15 years.
- Mar. 1. Dennis Pond, in Yarmouth, to inhabitants of Yarmouth, 15 years.
1. Crystal Lake, in Wakefield, to Lyman H. Tasker and others, 15 years.
20. Lower Naumkeag, in Ashburnham, to inhabitants of Ashburnham, 18 years.
28. Dennison Lake, in Winchendon, to inhabitants of Winchendon, 15 years.
- May 8. South-West Pond, in Athol, to Adin H. Smith and others, 15 years.
- June 1. Norwich Pond, in Huntington, to inhabitants of Huntington, 20 years.
10. Dug Pond, in Natick, to W. P. Bigelow and others, 15 years.
- Oct. 1. Little Pond, in Barnstable, to George H. Davis, 15 years.

[C.]

To the Commissioners on Fisheries for Massachusetts.

GENTLEMEN :—It has been my good fortune to witness much that has been done by your State for the last two years, in the way of attempting to restore to the people of New Hampshire their rights to ancient fisheries. I know of nothing that has been left undone (during my acquaintance with the subject) to satisfy them that you were acting in good faith, and it gives me great satisfaction to assure you that the people of my State no longer misapprehend your exertions or intentions. That there has been some misunderstanding in the past, is true, as I shall attempt to show.

Early last spring, "The Game and Fish League" of New Hampshire held its annual meeting at Manchester. The committee on "Fish and Fishways" reported that the Lawrence fishway was not only totally worthless, but that two-thirds of it had been carried away by the spring freshet. Believing that this report was without foundation, and was calculated to excite a prejudice in the minds of the people of my State which was already too strong, I replied to the report, somewhat at length, through the "Manchester Mirror," putting several pertinent and important questions relative to the habits of migratory fish, and the proper construction of fishways in general. The reply came the following week, which was merely personal in its character. No allusion was made to the questions propounded. Knowing how incredulous the people of my State were upon the subject of restocking their streams with migratory fish, and especially their disbelief in the Lawrence fishway, I thought it my duty to investigate. On the twelfth day of last June, I went to Lawrence, and had the water partially shut off, so that I could see to the bottom of every apartment distinctly. There were many fish to be seen in the various boxes, but more alewives than any other variety. This was enough to satisfy me that my friends at Manchester were not in the right. I next went to Lowell, when I found that there had been many alewives caught at the mouth of Beaver Brook. While at Lowell, I heard of these fish being taken at Cohas Brook, three miles from Manchester. I went there and talked with several persons who saw the fish and helped catch them. Soon after, it was reported that alewives had been seen, or had reached Goffe's Falls. An article appeared in the "Manchester

Mirror," headed "The Alewife Fraud," which gave the people to understand that the fish seen and caught at Cohas Brook had been brought there by interested parties from Lawrence *overland*, and put in at that point under the cover of night. The whole article was well calculated to excite the suspicions of a class who have never had faith in restocking the river. A member of your commission was challenged to reply. He accepted, and in his answer, not only closed the discussion, but gave a goodly amount of information to the people in various parts of the State, for which they have expressed proper individual acknowledgments.

In corroboration of the above statement, I append the following statements, cut from the "Manchester Mirror":—

LAWRENCE, July 15, 1876.

To the Editor of the Mirror.

I beg leave to say that I built the Lawrence fishway under the direction of the commissioners of the two States, that I have made the repairs upon it ever since, and that I can testify from personal observation that a great many alewives have *gone over* the fishway,—more, perhaps, this season than ever before.

Yours truly,

MORRIS KNOWLES, *Contractor and Builder.*

LAWRENCE, July 14, 1876.

To the Editor of the Mirror.

We beg leave to certify that we have taken special pains during a portion of the last four years to examine the Lawrence fishway, shutting it down twice a day during the times the fish were running, and we can assure your readers that a large number of alewives have gone over the fishway.

FRED. K. GILMAN, *Comr. of Streets for the City of Lawrence.*
JESSE MOULTON.

LAWRENCE, July 14, 1876.

To the Editor of the Mirror.

Having seen the statement headed "The Alewife Fraud," in your paper of July 1st, I beg leave to say that I am an *old fisherman*, that I live within a stone's throw of the Lawrence fishway, that no alewives have been PUT over the dam during the last six years, that I know from personal knowledge that a great many have *gone over the fishway* during these years. The idea that the fishermen of Lawrence, or any one else, transported alewives alive from here to Manchester, is too absurd for any one to believe.

Yours truly,

H. NOYES, *Fish Warden for the City of Lawrence.*

LAWRENCE, July 12, 1876.

MR. BRACKETT.

DEAR SIR:—I was at Lowell yesterday, and went over to the dam. I find that the flashboards were put on about the first of June. Since then no fish have gone over. The fish could get over the old dam, but the new dam is different, and fish cannot get over when the flashboards are on. I saw lots of alewives, suckers, and other small fish, trying hard to go up. The boards are two and a half feet high. If there was one length, or four or five feet taken off, it would be all right.

A. M. FARLIN.

GOFFE'S FALLS, July 17, 1876.

MR. E. A. BRACKETT, *Fish Commissioner of Massachusetts*.

DEAR SIR:—I am glad to have an opportunity to answer your question, "Have you seen any alewives at Goffe's Falls or Cohas Brook?" One evening during the last days of May, I heard that there were fish answering the description of alewives seen and caught at the mouth of Cohas Brook. The next evening, after the water was shut off, quite a number of people went to see the fish, myself with the rest, and can state that I saw them in considerable numbers. Many of them were caught by our people, estimated to be seventy-five each evening. I am surprised that any one should think they were brought here overland, for I understand that they cannot be carried even from Lawrence to Lowell alive.

IRA W. MOORE.

The new fishway at Lawrence has been examined by the present board of commissioners from New Hampshire. They have expressed their approbation of it in earnest language. Since it has been settled that alewives have gone over the old fishway, passed the Lowell dam, and reached Goffe's Falls, a new spirit seems to manifest itself along the Merrimack Valley. The events and correspondence of the past season have done much to mitigate a sentiment of impatience, as well as to allay a prejudice which from the beginning has been too apparent. I have reason to believe that not only the commissioners, but the people generally throughout my native State, will in the future be willing to coöperate with you in any course which may seem best calculated to ensure success.

Yours respectfully,

JOHN McNEIL,

[D.]

168 TREMONT STREET, BOSTON, November 21, 1876.

To the Commissioners of Inland Fisheries.

GENTLEMEN :—In reply to your suggestion, that I should give my opinion on the operation of the present smelt and trout laws, I would say : Smelt have increased largely, both in point of size and numbers. Owing to the great quantities of bait in our waters, hook-and-line fishing have not been as great a success as last fall, owing partly to the increase of bait, and also to the fact that the weather has been so warm that they have remained below instead of coming up the bay to their favorite haunts. All fishermen are agreed, I believe, on one point, and that is : they are seen in immense quantities, but will not take the hook. I have no doubt, when winter sets in and the ice makes, large quantities will be taken ; and as was the case last winter, hundreds of men will make a handsome living by catching legally through the ice. As to the trout law, it cannot but be a success, although it has been but a short time in existence. Letters which I have received from Maine all indicate that since the first of October poaching is done away with, the thieves having no market during the close time for their favorite stealings, either in Boston, New York, Vermont, or Connecticut.

I have one suggestion to make in regard to detectives for close time and seining laws, which have been and may be passed. Persons living in the vicinity of localities where the laws are broken, are afraid to enter complaints against offenders. Could not an addition to our present law be passed by our next Legislature authorizing our association or the Fish Commissioners to appoint special detectives for this purpose, as is the case in the "Society for the Prevention of Cruelty to Animals"? I believe it would be for the benefit of all concerned.

Yours truly,

JOHN P. ORDWAY, M. D.,
President Massachusetts Anglers' Association.

[E.]

To the Commissioners on Inland Fisheries.

SIXTH ANNUAL REPORT OF TISBURY GREAT POND, 1876.

| | |
|--|------------|
| Total catch, white perch, 4,647 pounds ; net proceeds, . | \$475 52 |
| smelts, 12,000 pounds ; net proceeds, . | 779 16 |
| alewives, net proceeds, | 910 32 |
| striped bass, net proceeds, | 15 00 |
| | <hr/> |
| | \$2,180 00 |
| Paid to town, | \$109 00 |

White perch increasing, and alewives plenty. About one thousand barrels of alewives were allowed to spawn in the pond this year. Have stocked ponds in Sterling and Chilmark with white perch.

ALLEN LOOK,
For Lessees.

To the Commissioners on Inland Fisheries.

FIRST ANNUAL REPORT OF OYSTER POND, WEST TISBURY, 1876.

| | |
|--|------------|
| Amount received for perch, alewives, smelts, and eels, . | \$1,682 00 |
| Percentage to town, | 88 06 |

ALLEN LOOK,
For Lessees.

SOUTH FRAMINGHAM, MASS., November 13, 1876.

To the Commissioners on Inland Fisheries.

REPORT OF WAUSHAKUM POND FOR 1876.

We find the lake thoroughly stocked and abounding with bass, but such is the amount of food for these fish, that they are seldom hungry enough to afford much sport for the angler. The hope of the members of the club is in the disappearance of the fry and coarser fish, through the feeding of the bass. Already there is a very apparent diminution in the pickerel and yellow perch ; but thus far, this diminu-

tion has acted (apparently) to allow of great increase in the minnow fry, through the disproportionate destruction of their former enemies. Consequent on this superabundant food-supply, the bass are increasing amazingly, and are growing very rapidly. The white perch added to the waters last year have not been seen, but their fry have been observed, so that the waters are now unquestionably stocked with this beautiful pan-fish.

A most beautiful illustration of the influence of food-supply on growth could have been observed at any time the past season, in the small bass fry. The following note illustrates:—

“JULY 11, 1876.—The young bass present the greatest variation in size. The majority, and they are numerous, are fat, healthy, active little pirates about one and a quarter to one and a half inches long, while some are two inches, two and a half inches, and even three inches in length. It is noticeable, that when these fish are fed, the largest and most active usually secure the food at the expense of the smaller fish. The solitary fish are also observed to grow faster than those which are in schools.”

This note has been verified by careful attention to the fish during the whole season.

As an interesting fact, if such it is, we have reason to believe that occasionally a bass may spawn in the fall, instead of in the spring. We have not proved this point, but we have found quite ripe spawn in a fish in November, and have seen young fish, not over one inch long, on the partial disappearance of the ice in spring.

One catch this year has been quite large. The largest caught was four pounds. The total number absolutely recorded are ninety-six fish, averaging full two pounds each. This catch is but the score of three members of the club, and probably two hundred at least have been taken.

TRUSTEES NOBSCOT FISHING CLUB,

By Z. BOYLSTON ADAMS, *Secretary*.

C. H. BARKER.

MILTON, October 24, 1876.

E. A. BRACKETT, Esq.

DEAR SIR:—Mr. Henry L. Pierce wishes me to report in regard to the stocking of Ponkapoag Pond, in Canton, with black bass.

There were originally put into the pond, in the fall of 1871, thirty-four fish. A screen was put in the outlet of the pond, which has been continued to the present time, to prevent the bass from leaving the pond. They have been increasing every year, and have not as yet made any perceptible difference in the quantity of the

native fish in the pond, as probably there never has been a season when more perch have been taken than this.

In our experience, we should think it best to stock all ponds with bass except those where there are trout. They are more gamey, and are better eating than pickerel, and give an additional zest to our pond fishing.

It is impossible to say how many perch and pickerel have been taken from the pond during the present year, but it is safe to say that about one hundred black bass have been taken. The bass were taken by persons who were fishing for perch and pickerel, special fishing for bass not being permitted.

Yours truly,

GEORGE S. ESTEY.

PITTSFIELD, MASS., November 27, 1876.

To the Commissioners on Inland Fisheries.

GENTLEMEN:—Since our last report, we have put into Pontoosuc Lake about five thousand young land-locked salmon.

We believe, from careful observation, that our community are soon to derive great advantage from fish put in the lake heretofore, as stated in our previous reports.

For the Lessees,

E. H. KELLOGG.

WEST UPTON, MASS., October 21, 1876.

To MR. E. A. BRACKETT, Commissioner.

At our annual meeting, it was voted to examine our pond, and to ascertain if the bass were doing well. Accordingly, in June and July, several gentlemen of the club examined the pond and found several spawning-beds. And later in the fall there seemed to be a great quantity of small fish, but I cannot say of what description. No bass have been taken in the past year, although Mr. D. B. Fisk of Chicago tried for them several times. Pickerel and perch have been taken, but in no large quantities. There seems to be less pickerel this year than formerly. We have not been troubled with poachers since the case at law was settled.

Respectfully,

D. W. BATCHELOR, *Lessee.*

WM. C. BATCHELOR, *Secretary.*

WORCESTER, November 1, 1876.

E. A. BRACKETT, ESQ.

SIR:—At the August term of the Superior Court for criminal business for the county of Worcester, there were entered, by appeal from the Third District Court of Southern Worcester, five cases? fishing without right in the Upton Pond (Pratt's Pond).

One of these cases was tried, and, after a verdict of guilty, was carried by exceptions to the Supreme Judicial Court. January 10, 1876, a rescript was received, overruling the exceptions.

The other four cases were continued at the term the first was tried, to abide the decision in that case. Consequently, at the January term last, those four cases were disposed of. The first-named—that against Tiffany—is now upon the docket.

The judgment and sentence in each of these four cases was a fine of \$20 and costs. Of these were paid: Leighton fined \$20, and costs, \$16.75; Barber fined \$20, and costs, \$17.55. Total (fines and costs), \$74.30.

Walker fined \$20, and costs, \$19.45; Aldrich fined \$20, and costs, \$20.50,—were committed for non-payment of fines and costs. I have no means of informing whether these were paid. The amount of costs in *Commonwealth vs. Tiffany* was \$65.44. From this you will perceive the whole amount of costs was \$139.74. Deducting what is paid, \$74.30, leaves expenses yet unpaid to the amount of \$65.44.

I hope you will find this what you desire.

I am, very truly yours,

JOHN A. DANA.

NEWTON CENTRE, November, 1876.

E. A. BRACKETT, ESQ., *Commissioner on Inland Fisheries.*

DEAR SIR:—In response to your request, I have to inform you that we have caught this season from Crystal Lake fifty-six black bass, weighing in the aggregate ninety-one pounds,—the smallest weighing one pound; the largest, four pounds. This is our sixth year since stocking our lake, and I think there is a general feeling of disappointment as to its results. At this period, we supposed that all we should have to do in order to capture fish would be to show them a hook; but such has not been the result of our patient waiting. Many of our club have made the entire circuit of the lake, trolling without success.

Although we have the usual evidence this year, as formerly, of their presence upon their spawning-beds, they have failed to answer our calls during the fishing season just past, and during the entire season, only two fish have been taken in the usual manner of bass-fishing, by trolling; in every other instance they have been taken by still fishing, near the bottom, in about fifteen to twenty feet of water. Our worthy ex-mayor, who is a member of our club, declares they have not been properly educated, and was induced to give nearly half a day of his valuable time in his endeavors to improve their sluggish habits, offering them the latest and most improved style of hooks, but without success. Our lake has neither inlet nor outlet, and but a slight water-shed, being fed almost entirely from springs at the bottom, and it is suggested by some that the fish lay in the cool water about these springs; others think they find food too plenty; of this we have no special evidence.

Yours respectfully,

E. M. FOWLE,

Secretary Newton Black Bass Club.

MILFORD, September 30, 1876.

Messrs. Fish Commissioners of Massachusetts.

Within the past year, we have taken from Mendon Pond black bass for stocking a pond in Westfield, Mass.; also for stocking a private pond in Whitinsville, owned by the Whitins. We put in Westfield fifty, averaging one and a half pounds each, and fifteen in Whitins', averaging the same. We have a contract to furnish the selectmen of Northborough one hundred, a part of which we are to deliver to-morrow. There has been taken from our pond, within the last year, about two hundred and fifty bass, and there seems to be an abundance yet remaining, with a fair supply of food as yet. I think our pond is well adapted to the cultivation of black bass.

Most respectfully yours,

DWIGHT RUSSELL,

Secretary of Nip Mug Pond Club.

LAWRENCE, October 28, 1876.

To the Commissioners of Inland Fisheries.

GENTLEMEN:—The lessees of Mitchell's Pond, situated in Boxford, Mass., beg leave to make the following report:—

In June, 1875, we placed in the pond twenty-one black bass, weighing from two to six pounds each, all in good condition; in August of the same year, thirty-nine more, weighing from two to five pounds, also in good order. In the spring of 1875, we procured of your Board about five hundred land-locked salmon, and placed them in the brook, a few rods from the pond. In the spring of 1876, we obtained some four or five thousand more in prime order, and placed them in the pond. We also, in the summer of 1874, by way of experiment, put into said pond from twenty to thirty thousand shad fry. Some of these shad were seen and taken late in the following autumn, about four inches in length. Since that time we have seen nothing of them. Some of the salmon were seen last spring, in the brook where they were placed. We have reason to believe that the black bass are doing finely, as we have seen very large numbers of the small fish. A large number of them have also been found in the mill-pond, a short distance below Mitchell's Pond, showing that the whole stream below is fast being stocked from our pond. Some of our large bass probably escaped during the high water last spring, as one large-sized one was found dead a short distance below the dam. No bass have been taken or killed to our knowledge, except the one mentioned above.

E. V. CROSS,

Chairman of the Executive Committee.

LINCOLN, MASS., October 19, 1876.

Commissioners on Inland Fisheries, E. A. BRACKETT, ESQ., Chairman.

GENTLEMEN:—In compliance with the conditions of the lease from the State of Massachusetts, I report for the lessees of Sandy Pond, in this town, that the black bass appear to be thriving. The lessees have fished for and caught some of them the past season. The whole number taken I am not able to give with exact accuracy, owing to the neglect to keep a record, but probably not far from fifty in all, varying in size from three-fourths of a pound to four pounds' weight.

We received from the Fish Commissioners on the nineteenth day of May last, three thousand fry of the land-locked salmon, which we

transported safely to the pond and deposited in its waters, but I have not heard of their being seen to be recognized by any one since.

We have not had any trouble with poaching, although occasionally parties have assumed the right to fish there in defiance of the authority of the Commonwealth of Massachusetts to lease the fisheries to us. Whenever notified, such persons have left without any resort to the law.

In behalf of the lessees of Sandy Pond,

JAMES L. CHAPIN.

LANCASTER, November 17, 1876.

To E. A. BRACKETT, *Commissioner on Inland Fisheries.*

DEAR SIR:—The two ponds—Great and Little Spec—in which one hundred black bass of good size were placed in 1873, are now well stocked, and in condition to be opened another season under proper restrictions. No fish have been taken for any purpose, and they have greatly increased both in numbers and size. During the past season thirty thousand young salmon, furnished by our State Commissioner, have been placed in the north branch of the Nashua River, which stream is well calculated for such purpose, if the waters are not contaminated by manufactories established above. These manufactories are becoming a serious obstacle to fish-breeding in some places, and unless some preventive action is soon taken, all efforts for fish-breeding will have to be abandoned. Early in the season, twenty-five thousand young land-locked salmon, obtained of the Commissioners, were placed in a private pond for feeding, preparatory to transferring them to a large and deep pond (Fort) another season. These have been fed twice a week during the summer, and the same course will be followed through the winter. They have improved in size very rapidly, and next spring will be in fine condition to be transferred to more extensive quarters.

If New Hampshire will furnish a fishway at Nashua, I think this place, with the bass and two kinds of salmon already placed, will soon be well supplied with the best varieties of fish. But our efforts will not be relaxed, for other varieties are necessary; and we shall not rest until these are obtained and properly placed.

Very respectfully, your obedient servant,

J. L. S. THOMPSON.

ASHBURNHAM, November 9, 1876.

To the Commissioners on Inland Fisheries.

SIRS:—I have the honor to present herewith the third annual report relative to the propagation of fish in our Upper Naukeag Lake. In May of the present year, we were so fortunate as to place in the lake five thousand land-locked salmon fry, all of which were procured at the hatching-house of the State, in Winchester, and transferred in excellent condition. Our stock, put into the lake, may be set down as follows:—

| | |
|---|-------|
| Black bass, procured in 1873, | 100 |
| Salmon-trout fry, procured in 1874, | 1,000 |
| Salmon-trout fry, procured in 1875, | 1,000 |
| Land-locked salmon fry, procured in 1875, | 500 |
| Yearlings, procured in 1875, | 200 |
| Land-locked salmon fry, procured in 1876, | 5,000 |
| <hr/> | |
| Total, | 7,800 |

Learning that there was a species of fish called fresh-water smelts, which were said to be excellent food for black bass and other valuable varieties of fish, and to propagate in great numbers, and that the Fish Commissioners of New Hampshire had so found them by experiments, I took from Sunapee Lake, Newbury, N. H., in May last, some five hundred of these fish, and placed them in our lake, so as to produce food for other fish. As in former seasons, every effort has been made by repeated visits and observation, to ascertain how near the theory started upon our practice had taken us. Once, and this was in August last, a company of five went to the lake and fished, trying deep and shallow waters, troll fishing, the fly, and deep sinking. Either the water was too warm, or there was such an abundance of natural food in the lake as to cloy the appetite of the fish, for only seven were caught, and they were bass obtained by deep sinking. Of these, four were two years old and about ten inches long, and three were yearlings, about seven inches long.

There is not the slightest doubt that the bass spawned the same season they were put in the lake, and the successive grades are easily distinguished in its waters. I regret that I am unable to give any accurate data concerning the land-locked salmon and salmon trout, having seen but few of either kind. Some of our citizens, however, who reside beside the lake, have assured me that they have noticed them in considerable numbers; and one in particular, an old fisherman, skilled in all the handicraft of hunting

and fishing, who has made special observations, tells me that he has many times seen the young land-locked salmon and trout, and that they are from four to six inches long.

These desultory statements may be of no special importance to your Board, unless they continue to show you, as they have already taught me, that we can confidently count upon the harvest time in this enterprise.

I am, with great respect,
Your obedient servant,

OHIO WHITNEY, *Agent*.

LYNN, MASS., October 16, 1876.

To the Commissioners on Inland Fisheries.

In this, my second annual report, I have little to add to the returns of last year.

Only two bass have been removed from the pond to my knowledge, and these by poachers. It is a fact perhaps worthy of note, that the pickerel and perch taken from the pond this year have been uniformly of large size, indicating that the smaller of either species have gone to swell the proportions of the new occupants.

Thinking it might be a convenience to some lessee, at some time, —as awhile ago it would have been to me,—to find in these annual reports a form of complaint in case of illegal fishing, I append the following, which is intended alike to apply both when the entire pond is used as a breeding-ground, and when, as in streams or in large lakes, an inclosure is made.

| | | | | |
|----------------|---|--|---------------|----------------|
| 108 Mass. 140. | } | complains that | of | in the county |
| Ib. 442. | | of | on the day of | A. D. 1876, at |
| 110 Mass. 175. | | in said county, in that portion of a certain pond of | | |

more than twenty acres in area, situate in said commonly known as
Pond; said pond being then and there leased to by the
Commissioners on Inland Fisheries, under section nine of chapter three
hundred and eighty four of the General Laws of Massachusetts, of the
year 1869, in which said portion fishes were then and there lawfully
artificially cultivated and maintained by the said lessee, did unlawfully
fish without the permission of said lessee, proprietor of said fishes,
against the peace, etc., etc.

Respectfully submitted.

JOHN L. SHOREY,
Lessee of Brown's Pond, Peabody.

LUNENBURG, October 17, 1876.

To the Commissioners on Inland Fisheries.

GENTLEMEN :—On making my second annual report of the fishes in our two ponds leased by you to the town of Lunenburg; viz., the Unkechewalom and Massapog ponds, I would state that by the generosity of E. A. Brackett, one of your board, I received between two thousand and three thousand land-locked salmon fry or fresh-water salmon, which I placed in Unkechewalom Pond and in the stream connecting this pond with Massapog Pond, by the advice of Mr. Brackett; so they can descend into Massapog or ascend into the other pond, as their inclination may lead them.

It is now two years (August 18, 1874) since the black bass were placed in these ponds, and I cannot learn that any fish have been taken from them since, the law has been so well observed and is so popular.

As fish and game have become property by our statutes, it would seem that corporations should have some statute provisions to enable them to protect their fish and game (if the town so vote), from outsiders having no property interest in them, which sometimes is a serious evil, when they carry off two-thirds of our fish and game to other towns.

Very truly, your obedient servant,

CYRUS KILBURN,
Agent for Lunenburg.

[F.]

[CHAP. 104.]

AN ACT REQUIRING CERTAIN RETURNS TO THE COMMISSIONERS ON
INLAND FISHERIES.

SECTION 1. The owner or owners of every pound, weir, or other similar fixed contrivance, or of any fishing pier, seine, drag or gill net, used in any of the waters of this State for fishing purposes, shall make written report, under oath, to the Commissioners on Inland Fisheries, on or before the first day of October in each year, specifying the number of each kind of edible fish caught by his or their respective pounds, weirs, or other similar fixed contrivances, piers, seines, drag or gill nets, during the year next preceding the date of said report.

SECT. 2. It shall be the duty of the Commissioners on Inland Fisheries to furnish each owner or proprietor of any pound, weir, or similar fixed contrivance, pier, seine, drag or gill net, on or before the fifteenth day of March in each year, with suitable blank forms for the reports required by the preceding section, so arranged that each day's catch may be separately recorded thereon; and in filling out such reports, such owner or proprietor shall give the results of each day's fishing, so far as practicable; and it shall be the duty of such owner or proprietor to apply to the Commissioners on Inland Fisheries for such blank forms,

SECT. 3. Whoever knowingly and wilfully violates any of the provisions of this act, shall be punished by a fine of not less than ten nor more than one hundred dollars.

SECT. 4. This act shall take effect upon its passage. [*Approved April 6, 1876.*]

The above act was passed too late to be operative during the past season; and the returns are therefore incomplete. They embrace sixteen river fisheries on the Taunton, Merrimack, and Connecticut, twenty-four seines and gill nets used in sea fishing, and seventeen pounds and weirs, as against fifty-seven mentioned in the United States Commissioner's report (see Table I). The act cannot fail to be very useful, and especially to the fishermen who make the returns, and who will thus, at trifling expense, furnish information which will protect them against such expensive and tedious legislative hearings as they have more than once been subjected to; and which will effectually prevent the passage of *sweeping* laws against certain methods of fishing, in cases where a few men only are to blame. Such returns, duly made out for a few years, will give the State a mass of information of vital importance in the encouragement of our fisheries.

TABLE No. 1.

Showing the Pounds mentioned in the United States Commissioner's Report as existing in 1871, and the Number from which Returns were received in 1876.

NUMBER OF POUNDS.

| | | | |
|------------------------------------|---|------------------------------------|----|
| Clark's Cove, | 1 | West Chop, M. Vineyard, | 1 |
| Sconticut Neck, | 1 | Falmouth, | 1 |
| West Island, | 1 | Waquoit, | 1 |
| Mattapoisett, | 1 | Coltuit, Vineyard Sound, | 1 |
| West Falmouth, | 1 | Kettle Cove, Naushon, | 2 |
| Quissett Harbor, | 2 | Nashawena, | 1 |
| Long Neck, Wood's Holl, | 2 | Provincetown, | 1 |
| Hadley Harbor, | 1 | Horse Island, Wellfleet, | 1 |
| Ram's Head, | 2 | Eastham, | 2 |
| Robinson Hole, Naushon, | 1 | Orleans, | 2 |
| Menemsha Bight, | 9 | Brewster, | 4 |
| Paintville, M. Vineyard, | 1 | Dennis, | 3 |
| Tisbury, | 2 | Yarmouth, | 2 |
| Lombard's Cove, | 6 | | — |
| Holmes' Hole, | 2 | | 55 |

NUMBER FROM WHICH RETURNS WERE RECEIVED IN 1876.

| | | | |
|---------------------|---|---------------------|----|
| Falmouth, | 1 | Brewster, | 2 |
| Chatham, | 4 | Dennis, | 1 |
| Harwich, | 2 | Yarmouth, | 1 |
| Eastham, | 5 | | — |
| Orleans, | 1 | | 17 |

TABLE NO. 2.—POUNDS AND WEIRS.
Showing the Catch of Each during 1876.

| TOWN. | N A M E. | Shad. | Blue-Fish. | Striped Bass. | Macarel. | Sea Herring. | Tautog. | Flounders. | Menhaden. | Squeteague. | Alewives. | Scup. | Eels. | Spanish Macarel. | Bonita. |
|-----------|------------------------|-------|------------|---------------|----------|--------------|---------|------------|-----------|-------------|-----------|--------|-------|------------------|---------|
| Falmouth, | Wood's Holl Weir Co.,* | — | 1,259 | 60 | 1,055 | — | 1,541 | 1,769 | † | 263 | — | 32,831 | — | 70 | 785 |
| Dennis, | L. Hall, | 3 | 2,818 | 288 | 2,217 | — | 3 | — | — | — | — | — | — | — | — |
| Harwich, | W. B. Kelley, | 218 | — | — | — | 525 | 142 | 257 | 4,250 | 8 | — | — | — | — | — |
| " | R. Chase, | 378 | 5 | — | — | 4,561 | — | 647 | 79,574 | 19 | 5,044 | — | — | — | — |
| Chatham, | Reed & Loveland, | 7,995 | — | — | 361,587 | 237,300 | — | 4,800 | 506,100 | — | — | — | — | — | — |
| " | G. W. Reynolds & Co., | 1,367 | — | 36 | 13,699 | 312,938 | 47 | 2,052 | 1,082,305 | 30 | 30,177 | 22 | — | — | — |
| " | C. Howes, | 360 | — | — | 6,817 | 3,000 | — | — | 24,000 | — | 8,150 | — | — | — | — |
| " | S. Bearce & Co., | 2,164 | — | — | 148,083 | 267,585 | — | — | 131,500 | — | — | — | — | — | — |
| Orleans, | G. Nickerson, | 4 | 9,844 | 33 | 5,519 | — | 77 | — | 1,423 | — | — | — | — | — | — |
| Eastham, | L. H. Walker, | 7 | 11,508 | 76 | 5,494 | 2,000 | 117 | — | 8,290 | — | 1,000 | — | — | — | — |
| " | W. Nickerson, | 1 | 2,042 | 11 | 163 | — | 192 | — | 750 | — | — | — | — | — | — |
| " | N. Smith, | 18 | 5,190 | 9 | 504 | — | 37 | — | 400 | — | 9 | — | — | — | — |

| | | | | | | | | | | | | | | | | | |
|-------------|------------------|---|--------|--------|-------|---------|---------|-------|-----------|-----|--------|--------|-----|----|-----|---|---|
| Eastham, . | A. K. Higgins, . | . | - | 2,170 | 9 | 557 | - | 113 | - | - | - | - | - | - | - | - | - |
| " | P. Smith, . | . | 38 | 7,055 | 60 | 3,750 | - | 41 | - | - | - | - | - | - | - | - | - |
| Brewster, . | F. Atwood, . | . | 34 | 979 | 76 | 352 | 112 | 126 | 1,105 | - | 8,738 | 1 | 200 | - | - | - | - |
| " | W. C. Parker, . | . | 7 | 799 | 36 | 249 | 610 | 36 | 18 | - | 2,236 | - | - | - | - | - | - |
| Yarmouth, . | B. Lovell, . | . | 8 | 1,854 | 324 | 1,448 | 2,800 | 16 | - | - | - | - | - | - | - | - | - |
| | | | 12,602 | 45,523 | 1,018 | 551,498 | 831,431 | 2,488 | 1,839,715 | 320 | 55,354 | 32,854 | 200 | 70 | 785 | | |

* The returns of this company were made in *pounds*, and were reduced to numbers by assuming an average weight for each species.

† Account not taken.

TABLE NO. 3.—POUNDS AND WEIRS.

Showing the runs of fish during 1876. "Scattering" means that a few fish were taken at intervals. "Steady" means that a moderate number were taken almost daily. "Heavy" means that, at the date affixed, a large quantity were taken.

| NAME AND PLACE. | Herring. | Bass. | Mackerel. | Blue-Fish. | Menhaden. |
|-----------------------------------|--|---------------------------------|--|---|--|
| Wood's Holl Weir Co., | - | - | Scattering, May 9; June 8. | Steady, June 20; July 15, 27; Sept. 15. | - |
| Nobseussett Fish Company, Dennis. | - | Steady, May 20 to September 14. | Heavy, July 4. | Steady, June 8 to 22; Aug. 10 to Sept. 14. Heavy, July 18, 19; Aug. 10, 11, 25, 30. | - |
| W. B. Kelley, Harwich, | Steady, Apr. 26 to May 5, | - | Steady, May 9 to 21. Heavy, May 22 to 27. | - | Steady, Apr. 29 to May 3, 10 to 20. Heavy, May 11. |
| R. Chase, Harwich, | Steady, April 10 to May 18. | - | - | - | Steady, Apr. 10 to June 6. Heavy, Apr. 19 to May 5, 6, 17 to 24, 27. |
| Reed & Loveland, Chatham. | Heavy, May 2 to June 4, | - | Heavy, May 12 to June 4, | - | Heavy, May 3 to June 4. |
| G. W. Reynolds & Co., Chatham. | Steady, May 5 to 20. Heavy, May 8, 10, 13, 14. | - | Steady, May 12 to June 2. Heavy, May 16, 23, 24, 28, 30. | - | Steady, May 7 to June 6. Heavy, May 9 to 17, 21 to 24, 29 to June 1, 5, 6. |
| C. Howes, Chatham, | Heavy, Apr. 29 to May 5, | - | Steady, May 19 to June 1. Heavy, May 25, 30. | - | - |
| S. G. Bearce & Co., Chatham. | Heavy, Apr. 18 to May 9, | - | Steady, May 9 to June 2. Heavy, May 14 to 30. | - | Heavy, May 7 to 27. |

| | | | | | | | |
|--------------------------------|----------------------|-------------------------------|---|--|--|--------------------------|---------|
| G. B. Nickerson, Orleans, | - | - | - | Steady, May 18 to 30. Heavy, May 20 to 29. | Steady, July 5 to 11, 16 to Sept. 6. Heavy, July 7 to 9, 18. | - | - |
| L. H. Walker, Eastham, | Steady, May 8 to 12, | - | - | Steady, May 18 to 28. Heavy, May 22, 24, 26. | Steady, July 18 to Aug. 22. Heavy, July 19, 21 to 29; Aug. 22. | Heavy, May June 4, 5. | 19, 23; |
| W. H. Nickerson, East- ham. | - | - | - | Scattering, May 23 to June 9. | Scattering, May 23 to Sept 14. | - | - |
| N. Smith, Eastham, . | - | - | - | - | Scattering, June 10 to August 5. | - | - |
| A. K. Higgins, Eastham, . | - | - | - | Scattering, May 22 to June 5. | Scattering, July 7 to Sep- tember 14. | - | - |
| P. Smith, Eastham, . | - | - | - | Scattering, May 26 to June 8. | Heavy, June 10 to 12, 17; July 23, 24. Steady, Aug. 8 to 24. | - | - |
| F. Atwood, Eastham, | - | - | - | - | Scattering, June 7 to Sep- tember 15. | - | - |
| W. C. Parker, Brewster, . | - | - | - | - | Scattering, June 8 to 22; July 17 to Sept. 15. | - | - |
| B. Lovell, Yarmouth, | Heavy, May 12, | Steady, July 2 to Aug. 10. | - | Slight, May 21 to 25. Heavy, July 4. | Heavy, July 19 to 22. Steady, Aug. 7 to Sep- tember 15. | - | - |

TABLE No. 4.—SEINES AND GILL NETS.
Showing the Catch of Each for 1876.

| TOWN. | N A M E. | Mackerel. | Blue-Fish. | Squeteague. | Scup. | Tautog. | Shad. | Menhaden. | Alewives. | Eels. | Striped Bass. |
|--------------|--------------------------------------|-----------|------------|-------------|-------|---------|-------|-----------|-----------|-------|---------------|
| Barnstable, | M. Sturges, . . . | 2 | 1,385 | 7 | 125 | — | 2 | — | — | — | — |
| “ | Hyannis Port, W. F. Corney, . . . | 2 | 1,850 | — | — | — | 2 | — | — | — | — |
| “ | . . . F. F. Pinney, . . . | 2 | 1,504 | 43 | 37 | 1,000 | — | — | — | — | — |
| “ | . . . H. Lambert, . . . | — | 3,767 | — | 235 | — | — | — | — | 200 | — |
| “ | . . . C. E. Bearce, . . . | — | 4,699 | — | 24 | — | — | 445 | — | — | — |
| “ | . . . T. Fuller, . . . | — | 3,498 | — | — | — | — | — | — | — | — |
| Chatham, . | . . . C. Howes, . . . | 3,759 | — | — | — | — | — | — | — | — | — |
| “ | . . . G. F. Harding, . . . | 6,829 | — | — | — | — | — | — | 527 | — | — |
| “ | . . . B. Kendrick, . . . | 4,012 | — | — | — | — | — | — | 148 | — | — |
| “ | . . . R. Mullett & Co., . . . | 2,249 | — | — | — | — | — | — | — | — | — |
| “ | . . . A. Harding & Co., . . . | 4,561 | — | — | — | — | — | — | — | — | — |
| Orleans, . . | . . . J. Sparrow, . . . | 680 | 820 | — | — | 2 | — | — | — | — | 1 |

TABLE NO. 5.—CONNECTICUT RIVER SEINES.

Showing the Catch of 1876.

| TOWN. | N A M E. | Shad. | Pike. | Suckers. | Striped Bass. |
|-------------------------------|-----------------------------------|--------|-------|----------|---------------|
| Agawam, | Alonzo Converse, | 2,051 | — | — | — |
| South Hadley Falls, | C. C. Smith and others, | 10,741 | 2 | 2 | 4 |
| | | 12,792 | 2 | 2 | 4 |

TABLE NO. 6.—MERRIMACK RIVER SEINES.

Showing the Catch of 1876.

| TOWN. | N A M E. | Shad. | Alewives. | Striped Bass. |
|--------------------------|-------------------------|--------|-----------|---------------|
| North Andover, | A. C. Hardy, | 3,290 | — | 6 |
| Groveland, | T. H. Balch, | 2,486 | — | 4* |
| " | W. B. Hardy, | 549 | 106 | — |
| " | S. K. Friend, | 198 | 71 | — |
| " | W. B. Hardy, | 556 | 117 | 2 |
| Amesbury, | J. Morrill, | 4,206 | — | 2 |
| | | 11,285 | 294 | 14 |

* Seventy-five pounds.

TABLE NO. 7.—TAUNTON RIVER SEINES.

Showing the Catch of 1876.

| TOWN. | N A M E. | Alewives. | Shad. | Striped Bass. |
|--------------------------------|---------------------------|-----------|-------|---------------|
| Berkley, | I. N. Babbitt, | 89,967 | 877 | — |
| " | D. B. Shove, | 15,200 | 746 | — |
| Berkley and Dighton, | C. N. Simmons, | 315,000 | 960 | — |
| Dighton, | N Chase, | 107,156 | 1,265 | 28 |
| Middleborough, | J. T. Wood, | 78,068 | — | — |
| Raynham, | G. B. Williams, | 51,566 | 251 | — |
| " | G. B. Williams, | 147,633 | 187 | — |
| Taunton, | J. W. Hart, | 82,299 | 280 | 1 |
| | | 886,889 | 4,566 | 29 |

TWELFTH ANNUAL REPORT

OF THE

COMMISSIONERS

ON

INLAND FISHERIES,

FOR THE

YEAR ENDING JANUARY 1, 1878.

BOSTON:

Rand, Aberg, & Co., Printers to the Commonwealth,
117 FRANKLIN STREET.
1878.

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Commonwealth of Massachusetts.

To His Excellency the Governor and the Honorable Council.

THE Commissioners on Inland Fisheries beg leave to present their Twelfth Annual Report.

FISHWAYS.

Fishways have been built the past season over all the dams on the Saugus River, with the exception of that owned by Philip Howe, who preferred, to hoist his gate, and give the fish the natural channel.

The agreement of the Agawam Canal Company to build a fishway over their dam on the Westfield River, on or before the first of September, was somewhat tardily complied with: the work has been commenced and the fishway nearly completed. The people of Westfield and other towns along the river, who have so persistently pushed for this pass, should now see to it that their part of the obligation is fulfilled; that all obstructions at this dam and the one below be kept out. There is a heavy penalty for any one who catches any fish within four hundred yards of this fishway or any other that may hereafter be built upon this river.

In company with the fish committees of the towns interested, we visited the East Taunton dam, commonly known as the Squawbetty dam, made a careful examination of the fishway now in use, and, after hearing all parties, decided that it was not suitable for the larger migratory fish. Plans of a fishway, the same as that at Lawrence, with specifications, have been forwarded to the owners. Mr. Robinson, in behalf of the company, expressed his willingness to comply with the request; but as the work to be done is considerable,

and the season getting late, he desired that it might be postponed until next summer, when the work will be commenced as early, and completed as soon, as the water will permit.

Nashua River.—The repeated efforts we have made to induce the former commissioners of New Hampshire, as well as the present board, to cause a fishway to be built at Nashua, have resulted in an arrangement, which, we trust, will be satisfactory to the numerous petitioners who have asked to have the river opened.

The following letter from Mr. Cadwell is expressive of the cordial treatment we have received, and their entire willingness to comply with the request:—

NASHUA, N.H., June 2, 1877.

E. A. BRACKETT, Esq., *Mass. Fish Commissioner.*

DEAR SIR, — Your recent visit here, together with previous visits and notifications from our New Hampshire Fish Commissioners, in relation to building a fishway at our dam on the Nashua River, prompts us to re-build our dam as early in the season of 1878 as circumstances will allow (which is earlier than actually necessary), at which time we shall be most happy to build a proper fishway: provided the commissioners will plan and direct the construction of same.

Yours truly,

W. D. CADWELL, *Agent Jackson Company,*
By TEMPLE.

The fishways are giving entire satisfaction, and in cases where migratory fish have been bred in the headwaters of rivers and streams, there is apparently no difficulty in their passing over in great numbers. There is, however, much yet to be learned as well as unlearned in regard to shad. The statement so often made, and so persistently kept before the public, that they are very timid fish, and that even the shadow of a bridge will frighten them, does not accord with our experience, and was, by the experiments of 1869, pretty thoroughly exploded. The edition of the report for 1870, containing a description of this experiment, has been nearly exhausted; and, as we are frequently called upon for information on this point, we reprint so much as relates to the pounding of the shad:—

“Hitherto it had been the custom to haul the seine, and examine each fish that was caught, trusting to fortune to find ripe breeders. The waste and uncertainty of this process are obvious. To obviate the trouble a pool was constructed, by damming a rivulet close to the river. As the fish were brought in, the unripe ones were carefully transferred to this pool, where they could be examined day by day, till the spawn was mature. Instead of dying immediately, or running themselves on shore in their fright (as had been expected), the shad thus ‘pounded’ seemed almost as tame as domestic animals. They sailed leisurely back and forth in the pool, and paid little attention to by-standers. Some were taken out of the water and examined at least half a dozen times with no bad result other than a considerable growth of conserva on those parts of the body injured by handling.”

The shad that passed over the Lawrence fishway during this season were quite as tame as any other migratory fish. There is nothing in the mechanical structure of the way, nor in their timidity or fear of entering there, that prevents their passing over. When they are bred far enough above to acquire a location, it may well be that they will take to the fishways quite as freely as the alewife.

ALEWIVES (*Alosa tyrannus*).

Quite a number of streams have been re-opened this year and restocked with this prolific fish. The run through the Lawrence fishway has increased.

In the Appendix will be found returns from several rivers and streams, showing the catch to have been large. A very small number of those controlling these fisheries have made returns; and this is to be regretted, as it is important not only to the fishermen but to the State that the value of the fisheries should be fairly represented.

SHAD (*Alosa præstabilis*).

The report of last year stated that it required no great amount of foresight to predict that there would be, within the next two or three years, a decided falling off in the shad-fisheries of the Connecticut and Merrimac; and we regret to say that the decrease has been even greater than was anticipated. It was in vain that we warned the fisher-

men on the Merrimac that their course was suicidal. Working in their interest as well as for the public good, it was hoped there would be a fair co-operation on their part: in this we have been disappointed. To have attempted any further legislation, or to have called in the State officers to aid in suppressing an evil, however apparent to those who understand the habits of fish, before it had shown any serious results, would have been a doubtful policy. Well demonstrated facts are stubborn things, and, to the mass of people, form the only reasonable ground for action.

So far as the future interests of the fishermen are concerned, the cause which has led to the present condition of the shad fisheries will, if properly heeded, be of the greatest importance. It was not a pleasant matter to be obliged to remind them, through the courts, of their duty as citizens, and their obligation to respect the laws; especially when the law is one, which, through their representatives, they pledged themselves to maintain. So persistently have they swept the river during the last three years, that very few spawning shad have been left to keep up the stock. And yet many of them will come before the legislative committee and swear, as they have done heretofore, that the more they catch the more plenty they will be. Their arithmetical education begins and ends with this one rule: Take two from four and six remain; or, in other words, Kill all your hens, and you will have an abundance of eggs and chickens next year.

A much better state of things may be expected hereafter. There are strong influences at work, tending to awaken in the minds of the fishermen a proper regard for their own interests. The consequences of their illegal fishing told this year in the shape of reduced profits. The friendly visits of the State officers relieved somewhat the dulness of the season. On the 27th of April, detectives Hunt and Allen made the acquaintance of A. C. Hardy, Robert Elliot, Isaac C. Sargent, and John F. Lord. These men were induced to visit the police court at Lawrence, invited to take front seats, and, when the performance was over, were desired to pay \$40 and costs of court, with confiscation of boat and seine. Two of these men were sworn officers of the town of North Andover, — one, fishwarden; the other, town constable. Mr. Hardy

claimed that he was fishing for one of the owners of the seining ground. This, however, could be no excuse for him. As a singular phase of character, often found among fishermen, it is proper to state that Mr. Hardy was for several years in the employ of the Commission, and was, in his dealings, honest to a cent; and once came to Boston in great haste to correct a mistake in his account, where he had charged the State seventy-five cents too much.

It is not only a duty we owe to the State of New Hampshire, but decidedly for the interests of the fishermen, that the law should be enforced. Nothing could be worse for them than a lawless disregard of regulations made as much for *their* welfare, as to discharge a just obligation to a sister State.

It is an important matter to know how many fish to take and yet leave enough to keep up the stock; and upon this question it may be said that fishermen, beyond the knowledge which enables them to *catch* them, are proverbially ignorant of the habits of fish, are reckless in the pursuit of their calling, and too much biased in what they believe to be their immediate wants, to form a disinterested judgment.

The breeding-grounds for shad below the Lawrence dam are very limited, and cannot possibly be made to keep up a large stock of fish, except by artificial culture. From several of the oldest fishermen, who have now retired, we learn that the law has never been enforced upon this river; that the fishermen generally managed to get, either one of their own number, or some one who sympathizes with them, appointed warden, and if, by mistake, any one was selected for that office who was disposed to work, they established a watch, and by means of signals easily eluded detection.

Something of this old system was tried at North Andover, where Mr. Hardy was warden; and at Point of Rocks, where Ordway & Brothers stationed a man on the lookout to give information of the approach of the officers. The latter escaped arrest, but lost their seine and boat. Messrs. Hunt, Allen, and Ayres, of the State Detective force, deserve much credit for the faithful discharge of their duties. They were generally successful in their prosecutions, checked to a great extent the poaching, and obtained a large amount of information which will be valuable for future action. If the fisher-

men will co-operate with the State, the depletion may be easily remedied, and the breeding-grounds extended the whole length of the river. The Commissioners of New Hampshire turned into the river, at Franklin, 400,000 young shad this season. Last year there were no shad seen at the Lawrence dam; this year all that were known to reach there passed over the fishway.

Connecticut River.

We closed our report last year with an earnest appeal to the Commissioners of Connecticut to see to it that this State was fairly dealt with. We regret to say that there appears to have been no action on the part of their Legislature looking to a restoration of our rights. The Commissioners of this State, through the assistance of Seth Green, established an easy and certain method of increasing shad by artificial cultivation. By this and other means, we, in connection with the Commissioners of Connecticut, made shad more plenty than they had been for half a century. This appears to have been our ruin. It made fishing profitable. Hundreds of people on the lower part of the river rushed into it. The Legislature, which had promised by its Acts to restrict the pounds at the mouth of the river, repealed the laws regulating them. The fishermen clamored for an extension of time; and the State granted the right to fish until the 25th of June, at which time all migratory fish have entered the river. In addition to a large number of seines, an army of gill-nets is permitted to patrol the river, day and night. And last, not least, a law has been passed allowing the capture of all adult salmon, which gives them no chance to reach their spawning-grounds when they return. It looks a good deal as if their fishermen owned, not only their seining grounds, but the Legislature also. It is, to say the least, a most singular specimen of political economy for a State to appoint able commissioners, and appropriate money to encourage a great and important industry, and then, on the first tide of success, to virtually surrender it into the hands of a class ignorant of the first principles of fish culture, proverbially reckless of the future and oblivious to the rights of other States. The result of all this is, that, while the fishermen below

have reaped a rich harvest, ours have not paid expenses. Our seining grounds are valueless.

In 1873, C. C. Smith at South Hadley Falls reported taking 92,065.000 shad spawn, while this year less than three million could be obtained; and where he caught, three and four years ago, from 10,000 to 15,000 shad, this season only 2,674 have been taken, and this is better than most of the seiners have done. The great spawning-grounds of the shad are in this State; without them the fisheries of the Connecticut would be of small value. We have appealed to the State of Connecticut to restore our rights, and we have appealed in vain. We therefore respectfully refer this matter to the Legislature for consideration. With the exception of the scarcity of shad in these two rivers, the cause of which has been fully explained, there has been a general increase of the fisheries throughout the State during the year.¹

CALIFORNIA SALMON (*Salmo quinnat*).

Of the two hundred thousand spawn received October, 1876, there were hatched and delivered 180,000: 10,000 were sent to the Saugus River, 30,000 to North River, 50,000 to Lancaster, and the balance taken by A. H. Powers, Commissioner for New Hampshire, to the head-waters of the Merrimac.

Mr. Powers makes the following report of what he did with them, and the remarkable condition in which they were transported.

STATE OF NEW HAMPSHIRE, OFFICE OF FISH COMMISSIONERS,
GRANTHAM, Jan. 11, 1877.

E. A. BRACKETT,

Commissioner of Inland Fisheries for the State of Massachusetts.

DEAR SIR, — Those one hundred thousand California salmon, which you so generously presented to the State of New Hampshire, were divided into four lots, estimated to contain twenty-five thousand each, and deposited in the head-waters of the Merrimac, as follows: —

Lot No. 1 was taken from the hatching-house on the fifth of December, 1876, and deposited in Baker's River, about one-half mile below the village of Warren. The temperature of the water at the time they were

¹ The above statement of the lawlessness of many of the fishermen near the river's mouth, and especially of the weir-men, is founded on positive information. Indeed, the strongest accusations are to be found in the reports of the Connecticut Commissioners. See Report for 1867, pp. 4, 5, and 25; for 1870, p. 6; for 1871, p. 30; for 1874, *passim*.

taken from the hatching-house was 45° ; on arriving at the cars it was 40° , and continued about that degree all the way to Warren, where the water in the river was ascertained to be about the same.

Lot No. 2 was taken from the hatching-house on the seventh of December, and conveyed to Wentworth, the temperature of the water being the same as lot No. 1. The temperature of the water in Baker's River at this place was 34° , and it took nearly two hours to lower the water in the cans to correspond. The young fry, though placed in such cold water, seemed quite as lively as those of lot No. 1.

Both of these lots were deposited in running water, free from ice.

Lot No. 3 was taken from the hatching-house on December 11; water at 45° . This was a cold, windy day. On the way to the depot the covers to the cans were frozen on. The train was three-quarters of an hour late, owing to some mishap; and, as it was impossible to remove the covers, we kept the cans in constant motion by shaking. The covers were thawed off as soon as possible after getting on the cars, and the water, which was full of anchor-ice, was found to be at 32° ; but the salmon were all alive, which was quite a surprise to us. The water steadily rose in temperature till it reached about 38° , varying from 37° to 39° in different cans.

At Plymouth the cans were placed in a open wagon, and carried about three miles to the Pemigewasset River, about half a mile above Livermore Falls. We were compelled to take a wagon, although there was nearly a foot of snow on the ground; for it lay in drifts, leaving part of the road entirely bare. It took an hour or more to complete the journey. When we arrived at the river the can covers were frozen on as before, and we could not remove them till we obtained hot water from a house near by. When they were removed we found that the entire inside of each can and cover was coated with ice about one-fourth of an inch thick, so that it would seem impossible for any air to enter the cans; but yet all the salmon appeared to be in good condition. Being very badly chilled, we omitted to test the temperature of the water, concluding that that in the river was no colder than that in the cans; so we cut a hole in the ice, and poured the salmon in. The change had no apparent effect upon them.

Lot No. 4 was taken from the hatching-house December 13, with the water at 45° , which was reduced to about 38° in conveying to the depot, and kept at that temperature till we arrived at Plymouth. They were then deposited in the river in front of the Pemigewasset House. Every straight, well salmon in all the lots was deposited in the streams in as good condition as when taken from the hatching-house.

Our success was entirely owing to the careful attention of Robert R. Holmes of East Wareham, Mass., who constantly attended to the welfare of the young fish, and did not seem to allow them to be out of his mind for a single moment.

For your generosity, hospitality, and numerous favors, please accept my sincere thanks. Hoping that, at some time, there will be an opportunity for me to reciprocate your kindness, I am

Yours respectfully,

A. H. POWERS.

We do not profess to know the habits of these fish any further than what we have seen during the few weeks they remain in the hatching-house: here they are very rapid in growth, hardy, and remarkably active. The question of flavor, which has elicited some discussion, may safely be left to the character of the waters they inhabit. Mr. Livingstone Stone, in his report to the United States Commissioner of Fisheries, asserts that they spawn but once, and then *die*; but this statement is so at variance with the known habits of kindred species, that he can hardly expect it to be received without challenge. His reasons are the following:—

1. After a considerable number of fish had run up the McCloud River, he threw across an *impassable barrier*, by which he stopped all the rest of the salmon, and, so to speak, pounded them for spawning.

2. As the barrier was a close one, the spent fish returning *down* stream, would have been stopped by it; but, although great numbers of dead salmon floated down, no living ones were noticed on the upper side of the barrier. Hence Mr. Stone infers that they all died, after depositing their eggs. But he only remained at the barrier till the early part of October, and the people of the country maintain that the spent fish go down *later* with the high water of the winter rains. The essential link in his argument is therefore wanting. Nor does it avail to say that the exhausted fish were not seen anywhere in the river, because they always hide and sulk at that period. That immense numbers do die from exhaustion, injuries, and wounds, may well be believed. It is instructive to remember that the same belief in death after spawning was once prevalent respecting our lamprey, and also the European shad.

It is to be regretted that Mr. Stone adopted this device for stopping salmon, especially if the barrier is to be a permanent one. Not only is it the worst example to the lawless people of the country; but it might, if persisted in, reduce the fishery to almost nothing, for the eight hundred thousand young put in the head-waters by Mr. Stone would give but a small return of adult salmon.

There is, however, a mystery about the young of these fish which has yet to be solved. Notwithstanding the hundreds of thousands that have been put into New England

waters, no one has yet been able to say with certainty that he has seen a single smolt. Either they cannot endure the winter in our rivers (which is not probable) or the smolts so closely resemble the young of *Salmo Salar* that they cannot be distinguished, or, what is most likely, their habits lead them into deeper and warmer water, and they drift earlier to the sea.

LAND-LOCKED SALMON (*Salmo sebago*).

The spawn received last season from Grand Lake Stream was not so good as that received heretofore. About one hundred and fifty thousand young fish were hatched and distributed as follows:—

| | | |
|---|---------|--------|
| O. Stowell, for ponds in Wakefield, | | 4,000 |
| H. E. Priest, for ponds in Waltham, | | 1,200 |
| C. Kilburn, for ponds in Lunenburg, | | 4,000 |
| Jas. L. Chapin, for ponds in Lincoln, | | 4,000 |
| S. H. Sylvester, for ponds in Middleborough, | | 20,000 |
| Jas. Hyde, for ponds in Newton, | | 3,000 |
| L. Luck, for ponds in South Weymouth, | | 4,000 |
| E. S. Merrill, for ponds in Winchendon, | | 4,000 |
| H. Newcomb, for ponds in Greenwood, | | 4,000 |
| Wm. H. Osborne, for ponds in East Bridgewater, | | 4,000 |
| O. Whitney, for ponds in Ashburnham, | | 5,000 |
| H. C. Bacon, for ponds in Boxford, | | 3,000 |
| H. F. White, for ponds in Middleton, | | 2,500 |
| B. S. Young, for ponds in Wellfleet, | | 5,000 |
| S. Nelson, for ponds in Georgetown, | | 4,000 |
| C. E. Peck, for ponds in Wilbraham, | | 5,000 |
| G. L. Fessenden, for ponds in Sandwich, | | 4,000 |
| F. W. Clapp, for ponds in Framingham, | | 5,000 |
| W. P. Bigelow, for ponds in Natick, | | 4,000 |
| J. D. Francis, for ponds in Pittsfield, | | 5,000 |
| Moses Joy, for ponds in Nantucket, | | 2,500 |
| E. H. Hartshorn, for ponds in Berlin | | 3,000 |
| Asa French, for ponds in Braintree, | | 3,000 |
| Wm. McNeil, for ponds in Lancaster, | | 15,000 |
| Captain Cushman, for ponds in Duxbury, | | 6,000 |
| Commissioners on Inland Fisheries for Halfway Pond, | | |
| Plymouth, | | 10,000 |
| Thomas Talbot, for Shawshine River, | | 8,000 |

| | |
|--|-------|
| E. N. Woods, for ponds in Huntington, | 3,000 |
| Fish Committee for ponds in Medford and Winchester | 2,000 |
| Charles Howes, for ponds in Essex, | 4,000 |

The success in several of the ponds where they were first distributed is such as to warrant a continued supply.

It would greatly simplify our labors if parties ordering would make application in writing, *early*, giving a careful description of the pond in which they desire to place them.

The plan is to furnish them at the State hatching-house in Winchester, free of charge, to all applicants having under their control any of the great ponds of the State. For transportation, parties should bring with them good clean half-barrels or milk-cans, holding ten or twelve gallons, a thermometer, and a dipper for aerating the water. The half-barrels will carry from four to five thousand, and the milk-cans about three thousand.

The introduction of these fish into ponds having neither inlet nor outlet for them to run into is an experiment, the result of which time alone can settle. That trout will breed in such ponds, and that these salmon spawn on the shoals of Sebago Lake, is well known.

SALMON (*Salmo salar*).

The following article from the Scientific Department of "Harper's Weekly" embodies about all that is generally supposed to be known of the habits of young salmon:—

"According to the drift of observations upon the European salmon, about one-half of the young, after being hatched, remain in the rivers one year before they go to the sea, the other half staying two years. They are then believed to pass down in the early spring, weighing from three to five ounces, and to return in the fall as grilse of as many pounds. After sojourning for a short time in the fresh water they return again to the sea before winter sets in, and come back the next spring as breeding fish of nine pounds and upward. Such is the most generally accepted hypothesis on the subject.

"Several intelligent observers in this country are inclined to disbelieve in a continued stay in the fresh water, and maintain that the young fish actually go to sea in the autumn of the same year in which they are born. Whether they come back the next year

as grilse, or remain longer, they are unprepared to say. Indeed, in the waters of Maine it is said that grilse are very seldom seen, and that it is only the mature fish that make their appearance.

“Recent examinations on the Miramichi are thought by Mr. Stilwell, of Bangor, to be strongly in favor of the assumption just referred to. He ascertained that the smolt spend the summer in the small brooks, where they remain until the autumn rains, after which they disappear, and are not seen anywhere after the month of October. Although trout were abundant, and could easily be captured, there was no evidence whatever that the young salmon remained in the waters.”

Recent experiments and observations on the Merrimac appear not only to throw doubt upon some of the above statements, but to indicate that none of the young salmon go to sea before they are two years old, and to prove that they are to be found at all seasons during this period at the headwaters of the rivers wherein they were deposited. Salmon hatched in the spring of 1876 were found in great abundance in the Pemigewasset and Baker's rivers this autumn (1877), from four to six inches in length, all with distinct parr marks upon them. That they belong to the planting of that year there can be no doubt, since none were put in in 1877. It is possible that many of them do not go down until the third year. The presence of full-grown parrs or smolts in the river next autumn would be conclusive upon this point. Our observations show, too, that the females do not return until they are four years old.

Another important fact has been ascertained, which may save expense in stocking rivers. Many of the fry deposited about two miles above Livermore Falls went twenty or thirty miles up the river, ascending the mountain streams, and pushing into all the tributaries; their instincts leading them into waters too rapid and cool to sustain perch and pickerel, and where their only enemies are brook trout and the piratical poachers calling themselves anglers.

In 1872 and 1873, Dr. William Fletcher, then Commissioner of New Hampshire, whose earnest and energetic labors in behalf of fish-culture will long be remembered with pleasure, anxious to put the young salmon in the best places possible, spent much time and money in carrying them from Plymouth to Thornton and Woodstock by private conveyance; all of

which might have been saved had their habits been better understood.

The return of mature salmon to the waters of the Merrimac this year commences a new era in the history of fish-culture in this country. It is, therefore, with feelings of the greatest pleasure that we are able to present the following condensed report of Thomas S. Holmes, of what he found passing over the Lawrence fishway during the past season.

Report of Thomas S. Holmes, Superintendent of Lawrence Fishway.

- May 4. Suckers.¹
 5. Suckers.
 6. Suckers.
 7. Suckers and alewives.
 8. Suckers and alewives. Alewives seen above the dam.
 9. Suckers and alewives. Run heavy.
 10. Suckers and alewives. Run heavy.
 11. Suckers.
 12. Alewives and suckers. Run moderate.
 13. Alewives and suckers. Run moderate.
 14. Alewives and suckers. Run moderate.
 15. Alewives, suckers, and lamper-eels.² Run moderate.
 16. Alewives and suckers. Run moderate.
 17. Alewives, suckers, and lamper-eels. Run heavy.
 18. Alewives, suckers, and lamper-eels. Run heavy. One trout.
 19. Lamper-eels, chubs,³ and suckers. Run moderate.
 20. Lamper-eels, chubs, and suckers. Run heavy. One black bass.
 21. Alewives, chubs, suckers, lamper-eels. Run heavy.
 22. Alewives, lamper-eels, a few chubs. Run heavy. Three black bass.⁴
 23. Alewives, chubs, suckers, and lamper-eels. Run heavy. Two black bass.
 24. Alewives, chubs, and lamper-eels. Run heavy. One trout.
 25. Alewives and lamper-eels. Run heavy. Two black bass, *one large shad*.
 26. Alewives, chubs, and lamper-eels. Run heavy.
 27. Alewives, chubs, and lamper-eels. Run heavy. Two black bass.
 28. Alewives, suckers, chubs, and shiners.³ Run heavy.

¹ *Catostomus*.

² *Petromyzon*.

³ *Leucosomus*.

⁴ *Grystes*.

- May 29. Alewives, lamper-eels, and suckers. Run heavy.
 30. Alewives and lamper-eels.
 31. *Two 8 to 12-lb. salmon.* Alewives, suckers, and lamper-eels. Run heavy.
- June 1. Suckers and lamper-eels. Run light.
 2. *Two large shad.* Alewives, suckers, and lamper-eels. Run heavy.
 3. *Three large shad*, two black bass. Alewives, suckers, and lamper-eels. Run heavy.
 4. One 12 to 15-lb. salmon.
 5. Two 12 to 15-lb. salmon.
 6. }
 7. } Low water, no fish.
 8. }
 9. }
 10. Two 12-lb. salmon.
 11. One 8-lb. salmon.
 12. Two 6 to 8-lb. salmon.
 13. One 10-lb. salmon.
 14. One 8-lb. salmon.
 15. One 8-lb. salmon.
 16. One 10-lb. salmon.
 17. Alewives, black bass, suckers, and lamper-eels.
 18. Alewives, black bass, suckers, and lamper-eels.
 19. One 18-lb. salmon.
 20. One salmon.
 21. Alewives and suckers.
 22. One 8-lb. salmon.
 23. Three 12-lb. salmon.
 24. Black bass and silver eels.
 25. One 10-lb. salmon. Silver eels.
 26. One 12-lb. salmon. Silver eels.
 27. Alewives, suckers, and silver eels.
 28. Two 8 to 10-lb. salmon. Silver eels.
 29. One 10-lb. salmon. Silver eels.
 30. Silver eels. *Alewives stopped running.*
- July 1. One 12-lb. salmon. Silver eels.
 2. Two 10 to 12-lb. salmon. Silver eels.
 3. Two 10 to 12-lb. salmon. Silver eels.
 4. Four 10 to 15-lb. salmon. Silver eels.
 5. Silver eels.
 6. Five salmon. Silver eels.
 7. One salmon. Silver eels.

8. Silver eels.
9. One 12-lb. salmon. Silver eels.
10. Silver eels.
11. Silver eels.
12. One 8-lb. salmon. Silver eels. *From this till the 23d,
no salmon.*
23. Three 8 to 12-lb. salmon. Silver eels.
30. Two large salmon. Silver eels.

In addition to the above record there was a fall run of salmon, which commenced Oct. 11, and ended Oct. 30. These fish, so far as seen in the way, were from six to ten pounds in weight. Much larger ones may have passed over, as Mr. R. R. Holmes saw one three feet long, near the hatching-house at Plymouth, the first of November.

The water was shut off from the fishway, for the purpose of ascertaining what was in it, *twice* a day, up to the 5th of July, and after that but *once* each day; this change being made in consequence of the injury done to the salmon, which, as the water shoaled in the way, became alarmed, ran in every direction, and often threw themselves against the sides with such force as to become helpless.

The closing of the way occupied about fifteen minutes each time, leaving twenty-three and one-half hours out of the twenty-four, during which nothing is known of the kind or number of fish passing through it. As the salmon did not loiter, but passed quickly over, it is fair to conclude that hundreds passed up unnoticed; and this conclusion is confirmed by well authenticated reports of the large numbers seen at Manchester, as well as all along the Pemigewasset.

Mr. Tompkinson of Livermore Falls counted twenty ascending the rapids in about two hours. Indeed, so common a thing was it to see them scaling the falls, that the White Mountain stage frequently stopped on the bridge to allow the passengers to see them. Mr. White, of Boston, who spent the summer at the Profile House, reports having seen, in one pool, thirteen large salmon from two and one-half to three feet long.

The report shows that forty-seven salmon were found in the fishway during an examination of thirty minutes a day for twenty-eight days. If we assume the running time at

twelve hours a day, the total number that passed over would be in this proportion, $47 \times 24 = 1,128$ salmon, to which must be added a certain number that passed over in October. Taking the weights as roughly estimated, we may say that about one in seven were rather small fish, of about eight pounds; one in seven were large fish, of fifteen pounds or more; and the great majority, or five in seven, were medium salmon, of ten or twelve pounds.

The following table will show the dates at which the batches of parrs were put in the river, and their respective ages up to the spring of 1877:—

| Put in the river. | 1873. Spring. | 1874. Spring. | 1875. Spring. | 1876. Spring. | 1877. Spring. |
|------------------------------|------------------|------------------|------------------|------------------|------------------|
| Spring 1872, 16,000 parrs, . | 1 yr. old. | 2 yrs. old. | 3 yrs. old. | 4 yrs. old. | 5 yrs. old. |
| " 1873, 185,000 " . | | 1 yr. old. | 2 yrs. old. | 3 yrs. old. | 4 yrs. old. |
| " 1875, 230,000 " . | | | | 1 yr. old. | 2 yrs. old. |
| " 1876, 400,000 " . | | | | | 1 yr. old. |

The few salmon of fifteen to eighteen pounds that ran up may have been of the batch of 1872; the smallest, of six and eight pounds (including those of the October run), may have been late or under-fed fish. Evidently the bulk of the salmon were of the plant of 1873, because the sixteen thousand parrs put in the year previous could not by any calculation have furnished one-fifth of the adult salmon that returned in 1877.

Several salmon were reported caught below Lawrence: some of these were killed, but most of the fishermen claim that they let them go again. Three were killed at the Lowell dam,—two by boys who professed not to know the law, and one later in the season was found in a pool near the dam, and in attempting to put him above he was so badly injured that he soon after died, and drifted down the canal; one was killed at Manchester by Mr. Kidder, superintendent of the gates. On the first of August, in company with the Commissioners of New Hampshire, we examined the Pemigewasset River as far as Woodstock, the Commissioners of that State having previously inspected Baker's River. Both were found full of young salmon; and the casting of a fly in any of the pools was sure to raise one or more from four to six

inches long. We are also sorry to say that we found that many had been destroyed by gentlemen from Boston, New York, and other cities, spending the summer at the hotels and boarding-houses along these rivers and their tributaries. Many of these gentlemen claim to be anglers, and boast of catching from one to two hundred trout a day, — mere fingerlings from two to four inches long; to such people a young salmon six or seven inches in length seems to have been a godsend. As most of them are men of means, it would not be amiss for them to somewhat increase their bank-account before visiting these waters again. Fifty dollars apiece for thirty or forty young salmon is no small item. They will find that public opinion in this matter has undergone a great change in New Hampshire during the last few months; and they may be sure of finding friends who will be more than willing to look after them, and see that no accident befalls them, — good staunch friends, to whom one-half the fine would be more money than they ever before dreamed of possessing.

Some of the oldest settlers on the Pemigewasset informed us that they had never known the large salmon so plenty as they have been this season. The Lawrence dam was closed in 1847, which prevented all fish going above. As a natural consequence, all salmon belonging to the river were soon exterminated, and it is now twenty-five years since any were seen at the dam.

The people of New Hampshire had become discouraged; and for the last two years their papers had indulged in some very severe attacks upon Massachusetts, and it was difficult to make them understand that we were doing all that could be done to restore the fisheries.

When it was found that salmon were passing over the fishway, word was sent to Manchester and above to look for them. The arrival of the first one at Manchester was attended with great excitement. They showed their interest and affection for him by *killing* him, and parading him through the streets.

A somewhat different state of affairs occurred a few days after, when some forty or fifty large salmon were stopped at the foot of the dam. The governor and council, with members of the Legislature, came to see them; but there had been quite a rise in the river the night before, enabling the salmon

to scale the dam, and while these distinguished gentlemen were anxiously looking for them at Manchester, they were passing Concord, and a day or two afterward made their appearance at Plymouth and Livermore Falls.

Satisfied that it was not the fault of the fish that they did not see them, and that the facts had been correctly reported, they went back to Concord, and did what they had not done for years, — voted a very handsome sum of money to enable their Commissioners to co-operate with those of Massachusetts to propagate and increase these fish.

In 1872 we put into the Pemigewasset 16,000 salmon fry; in 1873, 185,000; in 1874 we united with the other three States interested in the Connecticut River, and contributed 270,000 as our part of the 800,000 turned in at Bellows Falls. It soon became evident, that so long as things remained in the condition they were on the lower part of the Connecticut River, it would be time and money thrown away for the States above to make any effort to stock it with salmon. We therefore returned to the Merrimac, and in 1875 put in 230,000, and in 1876, 400,000. In addition to the above, there have been turned in during the last two years nearly 200,000 young California salmon.

As a single fact in confirmation of what has been so often said in former reports, we would state that no young salmon were put in Baker's River until 1875, and that all the returning salmon have gone *directly by* the mouth of that river up the Pemigewasset, where they were turned in.¹ It will be seen from the above, that what we have so long fought for — what the mass of the people have generally considered mere theories, visions of men who had fish on the brain — has been fully substantiated. It is true that it has taken longer than the Commissioners, in the beginning, had reason to expect. It is not easy, however, to see where, under existing circumstances, it could have been otherwise; for there was

¹The Pemigewasset and Baker's are two streams which unite to form the Merrimac. Both used to be salmon rivers, though Baker's was the inferior one. Now, if any smolts went to the sea when *one* year old, and returned when *two* years old, the plant of 1875 in Baker's River would have begun to return to it from the sea this year (1877). The same reasoning applies to the Pemigewasset; parrs nearly two years old were seen this season in great numbers.

scarcely any precedent to go by. The difficulty of constructing suitable fishways without injury to manufacturers, the prejudice of mill-owners, the depredations of fishermen, the impossibility of obtaining salmon spawn at a reasonable price, and the general want of co-operation, have all more or less tended to retard the work. The result is complete and decided, leaving no doubt as to what may be done in the future. The improvements made in the steam-engine during the last thirty years, especially as regards the consumption of fuel, have tended to lessen the value of water-power; while the possible decline of some of our most extensive manufactories suggests, with increasing force, the importance of a more energetic and careful attention to the agricultural and fishing interests of our State. The salmon fisheries of England and Wales produced, in 1870, \$750,000; Scotland, \$1,500,000; and Ireland, \$2,000,000. The River Tay, not larger than some of the tributaries of the Merrimac, yielded a rental of \$85,000.

There is no reason, except our own want of management, — our own neglect of that with which Nature has so bountifully provided us, — why our rivers should not be as productive as those of Europe. Under proper culture, with wise regulations, strictly enforced, it is not easy to overestimate the advantage that may accrue to the State by successfully carrying out what has already been demonstrated.

To this end we have united with the Commissioners of New Hampshire in establishing, at Livermore Falls, a hatching-house and ponds, supplied with both spring and river water. These are situated within a stone's throw of the river, where, by means of weirs, the spawning salmon can be turned into them. It is reasonable to think that the establishment may do as well as the celebrated one at Bucksport conducted so skilfully by Mr. Atkins. The cost of these works will be small, probably not exceeding four thousand dollars. In 1871 the price of salmon spawn in Canada, the only place it could be obtained, was forty dollars per thousand in gold. The salmon works at Penobscot, Me., afterwards reduced the price one-half; and subsequently the Bucksport establishment, started by the Commissioners of Maine, Connecticut, and Massachusetts, afterward assisted by the U. S. Commissioner, was able to furnish spawn at about three dollars a thousand.

There is reason to hope that the establishment at Livermore Falls will in a short time produce a large amount of spawn at a cost of less than one dollar per thousand.

Massachusetts was the first among the States to take interest in fish culture; and she is the first to demonstrate the theory of return, and the certainty of stocking our rivers and streams with migratory fish where they have never existed, or have been for a long time killed out.

This, with the invention of the form of fishway now in use, makes it possible to enormously increase our resources, without material injury to the mill-owners.

THEODORE LYMAN,
E. A. BRACKETT,
ASA FRENCH,

Commissioners on Inland Fisheries.

EXPENDITURES OF COMMISSION.

| | |
|--|------------|
| Salary, | \$1,650 00 |
| Travelling and other expenses, | 240 00 |
| | <hr/> |
| | \$1,890 00 |

GENERAL EXPENSES.

| | | |
|--|----------|------------------|
| Subscription to salmon enterprise, Schoo- dic, Me., | \$500 00 | |
| Labor on Plymouth, N.H., hatching-house, | 671 92 | |
| Labor on Lawrence fishway, | 70 00 | |
| Labor on Holyoke fishway, | 150 00 | |
| Labor on State hatching-house, | 16 50 | |
| R. R. Holmes, services and expenses deliv- ering blanks, | 271 00 | |
| Rent of land for fish-house, | 50 00 | |
| Printing, | 64 37 | |
| Plumbing and materials, | 191 91 | |
| Expenses on 100,000 salmon eggs from California to Chicago, | 46 50 | |
| E. H. Clarke, clerical services, | 30 00 | |
| Privilege of fishing in Merrimac River at Lawrence, | 30 00 | |
| Plans and specifications of fishways, | 31 00 | |
| Expressage, | 28 80 | |
| Incidental labor, | 17 75 | |
| Advertising, | 12 70 | |
| Dip-nets and charts, | 4 75 | |
| Miscellaneous, | 7 70 | |
| | <hr/> | 2,194 90 |
| Total to December 1, 1877, | | <hr/> \$4,084 90 |

APPENDIX.

[A.]

COMMISSIONERS ON FISHERIES.

UNITED STATES.

| | | | | |
|-------------------------|---|---|---|--|
| Prof. SPENCER F. BAIRD, | . | . | . | { Smithsonian Institution, Washington, D.C. |
|-------------------------|---|---|---|--|

MAINE.

| | | | | | |
|-------------------|---|---|---|---|-----------|
| E. M. STILWELL, | . | . | . | . | Bangor. |
| HENRY O. STANLEY, | . | . | . | . | Dixfield. |

NEW HAMPSHIRE.

| | | | | | |
|----------------|---|---|---|---|-------------|
| LUTHER HAYES, | . | . | . | . | Milton. |
| SAMUEL WEBBER, | . | . | . | . | Manchester. |
| ALBINA POWERS, | . | . | . | . | Grantham. |

VERMONT.

| | | | | | |
|---------------|---|---|---|---|----------|
| M. GOLDSMITH, | . | . | . | . | Rutland. |
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MASSACHUSETTS.

| | | | | | |
|-----------------|---|---|---|---|------------------|
| THEODORE LYMAN, | . | . | . | . | Brookline. |
| E. A. BRACKETT, | . | . | . | . | Winchester. |
| ASA FRENCH, | . | . | . | . | South Braintree. |

CONNECTICUT.

| | | | | | |
|--------------------|---|---|---|---|-------------|
| WILLIAM M. HUDSON, | . | . | . | . | Hartford. |
| ROBERT G. PIKE, | . | . | . | . | Middletown. |
| JAMES A. BILL, | . | . | . | . | Lyme. |

RHODE ISLAND.

| | | | | | |
|----------------------|---|---|---|---|-------------|
| NEWTON DEXTER, | . | . | . | . | Providence. |
| ALFRED A. REED, Jr., | . | . | . | . | Providence. |
| JOHN H. BARDEN, | . | . | . | . | Scituate. |

NEW YORK.

| | | | | | |
|----------------------|---|---|---|---|----------------|
| HORATIO SEYMOUR, | . | . | . | . | Utica. |
| ROBERT R. ROOSEVELT, | . | . | . | . | New York City. |
| EDWARD M. SMITH, | . | . | . | . | Rochester. |

NEW JERSEY.

| | |
|---------------------------|-----------|
| J. R. SHOTWELL, | Rahway. |
| G. A. ANDERSON, | Trenton. |
| B. P. HOWELL, | Woodbury. |

PENNSYLVANIA.

| | |
|-------------------------|----------------|
| H. J. REEDER, | Easton. |
| B. L. HEWITT, | Hollidaysburg. |
| JAMES DUFFY, | Marietta. |

MARYLAND.

| | |
|---------------------------|------------|
| T. B. FERGUSON, | Baltimore. |
| T. DOWNES, | Denton. |

VIRGINIA.

| | |
|------------------------------|-------------|
| A. MOSELY, | Richmond. |
| Dr. W. B. ROBERTS, | Lynchburg. |
| M. C. ELLSLEY, | Blacksburg. |

ALABAMA.

| | |
|---------------------------------|-------------|
| CHARLES S. G. DOSTER, | Montgomery. |
| RO. TYLER, | Montgomery. |
| D. R. HUNDLEY, | Courtland. |

OHIO.

| | |
|-----------------------------------|------------|
| JOHN C. FISHER, | Coshocton. |
| ROBT. CUMMINGS, | Toledo. |
| JOHN H. KLIPPART, | Columbus. |
| EMORY D. POTTER, Supt., | Toledo. |

MICHIGAN.

| | |
|----------------------------------|-----------|
| ANDREW J. KELLOGG, | Allegan. |
| GEO. CLARK, | Ecorse. |
| E. R. MILLER, | Richland. |
| GEO. H. JEROME, Supt., | Niles. |

IOWA.

| | |
|------------------------------|-----------|
| SAMUEL B. EVANS, | Ottumwa. |
| B. F. SHAW, | Anamosa. |
| CHARLES A. HAYNES, | Waterloo. |

MINNESOTA.

| | |
|--------------------------|-----------|
| WM. GOLCHER, | St. Paul. |
| R. O. SWEENEY, | St. Paul. |
| ROBT. ORMSBY, | St. Paul. |

CALIFORNIA.

| | |
|-------------------------------|----------------|
| B. B. REDDING, | Sacramento. |
| S. R. THROCKMORTON, | San Francisco. |
| J. D. FARWELL, | San Francisco. |

DOMINION OF CANADA.

| | |
|---------------------------|-----------|
| W. F. WHITCHER, | Ottawa. |
| W. H. VENNING, | St. John. |

ARKANSAS.

| | |
|---------------------------|---------------|
| N. H. FISH, | Pine Bluffs. |
| J. R. STEELMAN, | Little Rock. |
| N. B. PEARCE, | Fayetteville. |

WISCONSIN.

| | |
|---------------------------|-------------|
| A. PALMER, | Boscabel. |
| WILLIAM WELCH, | Madison. |
| P. R. HOY, | Racine. |
| A. F. DONS MAN, | Waterville. |

UTAH TERRITORY.

| | |
|---------------------------|-----------------|
| A. P. LOCKWOOD, | Salt Lake City. |
|---------------------------|-----------------|

KENTUCKY.

| | |
|--------------------------------|------------------|
| P. H. DARBEY, | Caldwell County. |
| POLK LAFFOON, | Hopkins “ |
| Dr. S. W. COOMBS, | Warren “ |
| Hon. C. J. WALTON, | Hart “ |
| PACK THOMAS, | Jefferson “ |
| Hon. JAMES B. CASEY, | Kenton “ |
| Hon. JOHN A. STEELE, | Woodford “ |
| J. H. BRUCE, | Garrard “ |
| Gen. T. T. GARRARD, | Clay “ |
| W. C. ALLEN, | Bath “ |

GEORGIA.

| | |
|---------------------------|----------|
| THOS. P. JANES, | Atlanta. |
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ILLINOIS.

| | |
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| W. A. PRATT, | Elgin. |
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NEVADA.

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| H. G. PARKER, | |
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NORTH CAROLINA.

| | |
|--------------------------------|---------------|
| Gov. Z. B. VANCE | Raleigh. |
| Prof. W. C. KERR | Raleigh. |
| Pres. R. P. BATTLE | Chapel Hill. |
| Col. S. M. HOLT, | Haw River. |
| Capt. S. B. ALEXANDER, | Charlotte. |
| Maj. JONATHAN EVANS, | Fayetteville. |
| Capt. J. R. THISPAN, | Tarboro'. |

[B.]

LISTS OF PONDS LEASED

By the Commissioners on Inland Fisheries, under Authority given by Chap. 384, Sect. 9, of the Acts of 1869.¹

1870.

- Feb. 1. Waushakum Pond, in Framingham, to Sturtevant and others, 20 years.
- Mar. 1. Tisbury Great Pond, in Tisbury and Chilmark, to Allen Look and others, 10 years.
- Apr. 1. Chauncey Pond, in Westborough, to Trustees Reform School, 5 years,
1. Mendon Pond, in Mendon, to Leonard T. Wilson and another, 20 years.
- June 20. Silver Lake, in Wilmington, to Charles O. Billings and others, 20 years.
- Sept. 12. Baptist Lake, in Newton, to J. F. C. Hyde and others, 20 years.
- Oct. 15. Archer's Pond, in Wrentham, to William E. George, 15 years.

1871.

- Jan. 10. Nine Mile Pond, in Wilbraham, to B. F. Bowles, 10 years.
30. Little Pond, in Falmouth, to F. H. Dimmick, 10 years.
- Apr. —. Spectacle, Triangle, and Peter's ponds, in Sandwich, to G. L. Fessenden and another, 5 years.
17. Long Pond, in Falmouth, to Joshua S. Bowerman and three others, 20 years.

¹ We would remind lessees of ponds that they are required, by their leases, to use all reasonable efforts to stock their ponds, and keep accurate records of the same, and make returns of their doings to the Commissioners on the *first of October*, each year, of the number and species of fish which they have put in or removed from their ponds. Any failure to comply with these conditions is a breach of contract invalidating their lease. It is important that the State should know just what is being done; and, where there appears to be mismanagement, or apparent failures, the Commissioners will visit the ponds, and ascertain, if possible, the cause.

1871.

- May 15. Pratt's Pond, in Upton, to D. W. Batcheller, 20 years.
18. Little Sandy Pond, in Plymouth, to William E. Perkins,
15 years.
Nov. 1. Punkapoag Pond, in Randolph and Canton, to Henry
L. Pierce, 20 years.

1872.

- Jan. 1. Sandy Pond. Forest Lake, or Flint's Pond, in Lincoln,
to James L. Chapin and others, 20 years.
Apr. 1. Onota Lake, in Pittsfield, to William H. Murray and
others, 5 years.
July 20. Little Pond, in Braintree, to Eben Denton and others,
20 years.

1873.

- May 1. Meeting-house Pond, in Westminster, to inhabitants of
Westminster, 15 years.
1. Great Pond, in Weymouth, to James L. Bates and
others, 15 years.
July 1. Little Sandy Pond, in Pembroke, to A. C. Brigham and
others, 16 years.
Sept 1. Pontoosuc Lake, in Pittsfield and Lanesborough, to E.
H. Kellogg and others, 15 years.
Oct. 1. Farm Pond, in Sherborn, to inhabitants of Sherborn, 15
years.
1. Spot Pond, in Stoneham, to inhabitants of Stoneham,
15 years.
Nov. 1. Lake Chaubunagungamong, or Big Pond, in Webster,
to inhabitants of Webster, 5 years.
Dec. 1. Lake Wauban, in Needham, to Hollis Hunnewell, 20
years.

1874.

- Mar. 1. Walden and White ponds, in Concord, to inhabitants
of Concord, 15 years.
2. Upper Nankeag, in Ashburnham, to inhabitants of Ash-
burnham, 20 years.
Apr. 1. Elder's Pond, in Lakeville, to inhabitants of Lakeville,
15 years.
20. North and South Podunk ponds, in Brookfield, to inhab-
itants of Brookfield, 15 years.
May 2. Brown's Pond, in Peabody, to John L. Shorey, 15 years.
1. Maquan Pond, in Hanson, to the inhabitants of Hanson,
15 years.
16. Wickaboag Pond, in West Brookfield, to Lemuel Ful-
lam, 15 years.
20. Unchechewalom and Massapog ponds, to the inhabit-
ants of Lunenburg, 20 years.

1874.

- July 1. Hardy's Pond, in Waltham, to H. E. Priest and others,
15 years.
1. Hockomocko Pond, in Westborough, to L. N. Fairbanks
and others, 15 years.
11. Mitchell's Pond, in Boxford, to R. M. Cross and others,
15 years.
11. Hazzard's Pond, in Russell, to N. D. Parks and others,
20 years.
- Oct. 1. East Waushacum Pond, in Sterling, to inhabitants of
Sterling, 20 years.
20. Middleton Pond, in Middleton, to inhabitants of Mid-
dleton, 15 years.

1875.

- Jan. 1. White and Goose ponds, in Chatham, to George W.
Davis, 15 years.
- Mar. 1. Lake Pleasant, in Montague, to inhabitants of Monta-
gue, 10 years.
1. Hood's Pond, in Ipswich and Topsfield, to inhabitants
of Topsfield, 15 years.
- Apr. 1. Chauncey Pond, in Westborough, to inhabitants of
Westborough, 15 years.
3. West's Pond, in Bolton, to J. D. Hurlburt and others,
15 years.
15. Gates Pond, in Berlin, to E. H. Hartshorn and others,
15 years.
24. Pleasant Pond, in Wenham, to inhabitants of Wenham,
15 years.
- May 1. Morse's Pond, in Needham, to Edmund M. Wood, 15
years.
1. Great Pond, in North Andover, to Eben Sutton and
others, 20 years.
1. Chilmark Pond, in Chilmark, to J. Nickerson and others,
agents, 20 years.
- July 1. Winter Pond and Wedge Pond, in Winchester, to
inhabitants of Winchester, 15 years.
1. Haggett's Pond, in Andover, to inhabitants of Andover,
20 years.
- Aug. 1. Oyster Pond, in Edgartown, to J. H. Smith and others,
20 years.
7. West Waushacum Pond, in Sterling, to inhabitants of
Sterling, 20 years.
9. Mystic (Upper) Pond, in Winchester, Medford, and
Arlington, to inhabitants of Winchester and Medford,
15 years.

1875.

- Oct. 1. Little Chauncey and Solomon ponds, in Northborough, to inhabitants of Northborough, 15 years.

1876.

- Feb. 1. Great Sandy Bottom Pond, in Pembroke, to Israel Thrasher and others, 15 years.
- Mar. 1. Dennis Pond, in Yarmouth, to inhabitants of Yarmouth, 15 years.
1. Crystal Lake, in Wakefield, to Lyman H. Tasker and others, 15 years.
20. Lower Naumkeag Pond, in Ashburnham, to inhabitants of Ashburnham, 18 years.
28. Dennison Lake, in Winchendon, to inhabitants of Winchendon, 15 years.
28. Phillipston Pond, in Phillipston, to inhabitants of Phillipston, 20 years.
- May 8. South-West Pond, in Athol, to Adin H. Smith and others, 15 years.
- June 1. Norwich Pond, in Huntington, to inhabitants of Huntington, 20 years.
10. Dug Pond, in Natick, to W. P. Bigelow and others, 15 years.
- Oct. 1. Farm and Learned's Pond, in Framingham, to inhabitants of Framingham, 15 years.
1. Whitney's Pond, Wrentham, to inhabitants of Wrentham, 15 years.
1. Little Pond, in Barnstable, to George H. Davis, 15 years.
- 1877.
- Mar. 1. Nine Mile Pond, in Wilbraham, to inhabitants of Wilbraham, 15 years.
15. Pentucket and Rock Ponds, in Georgetown, to inhabitants of Georgetown, 15 years.
- Aug. 10. Onota Lake, in Pittsfield, to William H. Murray and others, 15 years.
- Oct. 1. Fort, Great Spectacle, and Little Spectacle ponds, in Lancaster, to inhabitants of Lancaster, 20 years.

RETURNS ON PONDS.

ASHBURNHAM, Nov. 15, 1877.

To the Commissioners on Island Fisheries.

GENTLEMEN, — In presenting the fourth annual report upon the stocking of our upper Nankeag Lake with useful fishes, I desire to say that the experiment is working satisfactorily. With a view to test the condition and numbers of these fish, a party, by invitation, visited the lake on the 3d of July last, having with them all the necessary outfit for various kinds of fishing; and after two hours had thus been spent, fifteen bass were brought in, varying in weight from one-fourth of a pound to three pounds and a half, all of which, with the exception of the largest, were immediately put back into the lake. They were in handsome condition, plump and hard, and with the exception of the largest, — somewhat injured in the taking, and so not put back, which undoubtedly belonged to the original lot brought from Lake Champlain, — had all grown in the lake.

In the shallow waters could be plainly discerned countless numbers of small fry hatched in the spring; but such is the abundance of natural food in the lake, there is no prospect of an overstocking. I regret that I am unable to afford the Commissioners any information concerning the land-locked salmon and salmon-trout, no fish of either variety having been caught, although put in the lake at the same time.

I am still sanguine, however, that ere long they will show themselves more freely. Most of the land-locked salmon fry obtained of Mr. Commissioner Brackett, in June last, are still in my private ponds, in the hope that when they are a year or more old they may with more success be transferred to stock the lake. There is still a strong feeling of interest on the part of all our citizens in the success of the enterprise; and it was handsomely tested in an offer of five hundred dollars, and all expense, to the town for the lease, by a citizen of Boston much enamored of the sport, who desired

it as a private ground, which the town quite unanimously refused. Thanking your Board for their continued courtesies,

I remain,

Very respectfully yours,

OHIO WHITNEY, *Agent.*

PITTSFIELD, Dec. 6, 1877.

E. A. BRACKETT, Esq., *Fish Commissioner.*

DEAR SIR, — In compliance with the law, I now make what report we have to make in regard to stocking our lake with fish. We have not put any fish in for the past year, as we did not know as we should take a new lease; but we can report that black bass, rock bass, English carp, and land-locked salmon have certainly proved a success; but we have nothing which assures that lake trout have taken, although over 40,000 have been put in. The land-locked salmon we had of you two years ago are about six inches long, and will weigh about four to six ounces. Will try and make a better report next time.

Yours truly,

WILLIAM H. MURRAY, *for Lessee.*

ATHOL, Oct. 20, 1877.

To the Commissioners on Inland Fisheries.

GENTLEMEN, — We present this, our first report. After taking a lease of South-west Pond, we selected the following officers: E. J. Gage, *President*, A. H. Smith, *Vice-President*, W. W. Fish, *Treasurer*, H. W. Smith, *Secretary*; and voted to be known as the South-west Pond Fishing Club, to carry out the provisions of the lease granted by the Fish Commissioners; and by a vote of the club, E. J. Shaw was appointed to go to Winchester, and receive of the Commissioners the number of land-locked salmon fry to be placed in said pond. He received from Mr. Brackett 3,000 land-locked salmon fry, and they were transported and placed in said pond without the loss of one.

The September following, H. W. Smith and E. J. Shaw went to Sunapee Lake, N.H., and procured 268 black bass, of the average weight of one pound, and lost 17 in transportation, and placed 251 in said pond in good condition. And during the past year, repeated visits and observations have been made, and num-

bers of black bass can be seen at any time in different parts of the pond; and in one of the main brooks land-locked salmon were quite numerous, from two to three inches long; and we have every reason to think they are doing well.

We have not taken fish of any kind from the pond since the lease was granted, and have every reason to think that none have been caught, as the families in the vicinity of the pond have been very much interested in the success of the enterprise, and have warned all persons that the pond was private property, and that no person was allowed to fish in it.

And we assure your honorable board, that, in our opinion, there is no doubt of its ultimate success.

Respectfully yours,

HENRY W. SMITH,

Secretary South-west Pond Fishing Club.

WINCHENDON, MASS., October, 1877.

To the Commissioners on Inland Fisheries.

GENTLEMEN, — We are unable to make a very detailed report at this time, as to the small land-locked salmon received from the State Commissioners, and placed in our waters, as it is too soon to see very decided results. During the first year of our lease of Dennison Lake (in Winchendon, Mass.), we put in some three hundred and fifty black bass; and we are able to report that they are doing well, and large numbers of young bass have been seen this season, showing that the process of stocking said lake is progressing rapidly.

There was some opposition to the leasing and stocking of those waters at first, by some of our citizens; but we think our people universally favor it now, and are anxious for the success of the enterprise, and do not fish the waters that are leased, and keep watch that others do not.

We received from the honorable Fish Commissioners a second lot of land-locked salmon in June, but have not been able to see any of them since. Of the first lot, put in in the summer of 1876, a few have been seen this season; and we can hope that, as they increase in size, we can see more of them, and in the future be able to give a fuller report of their increase, growth, &c.

We are pleased to report that the best of feeling prevails among

our people with regard to the terms of our lease ; and that it shall be faithfully carried out in the hope that we may have a supply of bass and salmon at the end of the four years.

Respectfully submitted,

E. S. MERRILL,
Chairman.

H. H. WYMAN,
Secretary of Board of Fish Commissioners.

NEWTON CENTRE, Oct. 18, 1877.

To the Commissioners of Inland Fisheries.

GENTLEMEN, — In accordance with the terms of our lease, I have now to make the annual report of the result of the past year's operations. This is the seventh year of our lease, and our patience is now being amply rewarded by fair results. There have been taken in all, this season, eighty-five black bass, weighing, in the aggregate, one hundred and thirty-nine pounds. The largest weighed four pounds, smallest, one pound, though several smaller were taken, but returned to the water ; a few good-sized pickerel have also been taken, and quite a number of fine red perch, weighing half a pound each.

Not more than half a dozen bass have been taken with a fly and trolling ; but minnow bait near bottom, in about twenty or thirty feet of water, has given the most successful result. Large numbers of smaller bass fry, two to three inches long, have been noticed in the shallow water ; and we have every evidence that the undertaking is a success, and as the bass increase in numbers, and their food (which is now plenty) decreases, we shall see them ready to respond to the tempting fly of the most careless fisherman.

We have to acknowledge with thanks the receipt of a quantity of land-locked salmon fry early in the spring, which we placed in our pond as an experiment. It may prove, however, as only food for the bass ; but we will report facts later.

E. M. FOWLE,
Secretary of Newton Black Bass Club, Crystal Lake.

LUNENBURG, Oct. 20, 1877.

To the Massachusetts Commissioners on Inland Fisheries.

GENTLEMEN, — In making my annual report of our two leased ponds in Lunenburg, the Unchechewalom and Massapog Ponds, I state that, through the kindness of E. A. Brackett, Esq., one of your Commission, I received about five thousand land-locked or fresh-water salmon fry at Winchester, and placed the same in Unchechewalom Pond, and in the stream connecting the two ponds last May. And the twenty-five hundred placed in the pond and stream last year will test the experiment of raising salmon in our ponds.

The inhabitants living in the vicinity of our two ponds inform me that they have frequently seen the black bass in the ponds of different sizes. One man told me he saw as many as twenty black bass near the outlet of Massapog, that would weigh one and a half pounds apiece; another man said that he had a fair view of a bass in Unchechewalom Pond, that would weigh five pounds, as well as many smaller ones. The inhabitants of our town are observant of the prohibition contained in our lease; but I am sorry to say that some non-residents (poachers) have trespassed in a few cases, and taken some fish from these ponds. Our selectmen are taking measures to bring one of the poachers to justice.

Some of these trespassers find it difficult to believe that "hunting and fishing" is not "free."

The inhabitants of this town claim the right to protect our birds and fishes from poachers and plunderers from abroad, who annually infest our town, and carry off our game.

And if our claim is not sustained by our present law, we must apply to our Legislature for a law that will protect us, and all other places, when the inhabitants thereof so vote.

Yours respectfully,

[C.]

LEGISLATION. — 1875.

[CHAP. 39.]

AN ACT TO AMEND CHAPTER SEVENTY-SIX OF THE ACTS OF THE YEAR EIGHTEEN HUNDRED AND SIXTY-NINE, RELATING TO FISHING IN THE CONNECTICUT RIVER.

Be it enacted, &c., as follows :

SECT. 1. Section one of chapter seventy-six of the acts of the year eighteen hundred and sixty-nine is hereby amended, so that shad may be taken from the Connecticut River with rod and line, and artificially-baited hook at any time between the fifteenth day of March and the first day of August in each year.

SECT. 2. This Act shall take effect upon its passage. [*Approved March 8, 1875.*]

[CHAP 115.]

AN ACT TO AUTHORIZE THE LEASING OF GREAT PONDS IN DUKES COUNTY.

Be it enacted, &c., as follows :

SECT. 1. The Commissioners on Inland Fisheries may lease any great pond, exceeding twenty acres in area, situated within the limits of Dukes County: *provided*, that the town or towns within which said pond lies shall, after the notice now required by law, at a meeting called for that purpose, assent to the granting of such lease.

SECT. 2. Chapter three hundred and sixty of the acts of the year eighteen hundred and seventy is hereby repealed.

SECT. 3. This Act shall take effect upon its passage. [*Approved April 10, 1875.*]

[CHAP. 180.]

AN ACT TO PROHIBIT SEINING OF FISH IN THE PONDS ON THE ISLAND OF NANTUCKET.

Be it enacted, &c., as follows :

SECT. 1. No person shall set, draw, or use any seine or net for taking fish in the great ponds on the island of Nantucket.

SECT. 2. Any person violating this Act shall, on conviction, pay a fine of not less than twenty-five nor more than fifty dollars, with forfeiture of

boats, nets, and apparatus thus used, to be recovered before any court of competent jurisdiction, for the use of the town of Nantucket.

SECT. 3. This Act shall take effect upon its passage. [*Approved May 3, 1875.*]

1876.

[CHAP. 50.]

AN ACT CONCERNING THE OBSTRUCTIONS TO THE PASSAGE OF FISH IN
THE TRIBUTARIES OF THE CONNECTICUT AND MERRIMACK RIVERS.

Be it enacted, &c., as follows:

SECT. 1. The provisions of chapter two hundred and thirty-eight of the acts of the year eighteen hundred and sixty-six, and of chapter four hundred and twenty-two of the acts of the year eighteen hundred and sixty-nine, are hereby extended, and shall apply to the tributaries of the Connecticut and Merrimack Rivers within this Commonwealth.

SECT. 2. This Act shall take effect upon its passage. [*Approved March 16, 1876.*]

[CHAP. 62.]

AN ACT TO AUTHORIZE THE COMMISSIONERS ON INLAND FISHERIES TO
OCCUPY GREAT PONDS FOR THE CULTIVATION AND DISTRIBUTION OF
USEFUL FISHES.

Be it enacted, &c., as follows:

SECT. 1. The Commissioners on Inland Fisheries, as such commissioners, are hereby authorized to occupy, manage, and control any great ponds within the limits of the Commonwealth, not exceeding six in number, and not then subject to lease from them, for the purpose of cultivating useful fishes, and of distributing the same within the Commonwealth, subject to the restrictions and limitations contained in chapter three hundred and eighty-four of the acts of the year eighteen hundred and sixty-nine as to leased ponds.

SECT. 2. Whenever said commissioners shall determine so to occupy and improve any such pond, they shall post a notice of such purpose in some public place in the town or towns in which said pond is located, and shall file a like notice in the office of the town clerk of said town or towns, and in the office of the Secretary of State; and the affidavit of any officer qualified to serve civil process that said notice has been posted shall be deemed full proof of the same.

SECT. 3. From and after the time when said notice shall have been filed and posted as above, said Commissioners shall have all the rights in respect to said pond as are secured to lessees of ponds from said Commissioners; and any violation of any of said rights shall be subject to the penalties imposed by section nineteen of said chapter.

SECT. 4. This Act shall take effect upon its passage. [*Approved March 22, 1876.*]

[CHAP. 104.]

AN ACT REQUIRING CERTAIN RETURNS TO THE COMMISSIONERS ON
INLAND FISHERIES.

Be it enacted, &c., as follows :

SECT. 1. The owner or owners of every pound, weir, or other similar fixed contrivance, or of any fishing-pier, seine, drag or gill net, used in any of the waters of this State for fishing-purposes, shall make written report, under oath, to the Commissioners on Inland Fisheries, on or before the first day of October in each year, specifying the number of each kind of edible fish caught by his or their respective pounds, weirs, or other similar fixed contrivances, piers, seines, drag or gill nets, during the year next preceding the date of said report.

SECT. 2. It shall be the duty of the Commissioners on Inland Fisheries to furnish each owner or proprietor of any pound, weir, or similar fixed contrivance, pier, seine, drag or gill net, on or before the fifteenth day of March in each year, with suitable blank forms for the reports required by the preceding section, so arranged that each day's catch may be separately recorded thereon; and in filling out such reports, such owner or proprietor shall give the results of each day's fishing so far as practicable; and it shall be the duty of such owner or proprietor to apply to the Commissioners on Inland Fisheries for such blank forms.

SECT. 3. Whoever knowingly and wilfully violates any of the provisions of this Act shall be punished by a fine of not less than ten nor more than one hundred dollars.

SECT. 4. This Act shall take effect upon its passage. [*Approved April 6, 1876.*]

1877.

[CHAP. 119.]

AN ACT TO AMEND AN ACT IN RELATION TO THE CONSTRUCTION OF
FISH-WEIRS.

Be it enacted, &c., as follows :

Chapter fifty of the Acts of the year eighteen hundred and fifty-six is hereby amended by adding the following section: Sect. 4. No person shall construct or maintain any fish-weir within the tide-waters of this Commonwealth unless authorized in the manner set forth in the first section of this Act, or from any island within said tide-waters without authority in writing from the mayor and aldermen of every city, and the selectmen of every town, distant not over two miles from said island. Any person who shall construct or maintain any weir in violation of the provisions of this section shall forfeit the sum of ten dollars for each day he shall maintain such weir, to be recovered in any court of competent jurisdiction to the use of any cities or towns, from the mayor and aldermen or selectmen of which he ought to have obtained the authority aforesaid, and shall also be liable to be indicted therefor and to be enjoined therefrom. [*Approved April 10, 1877.*]

[CHAP. 180.]

AN ACT IN ADDITION TO AN ACT FOR ENCOURAGING THE CULTIVATION OF USEFUL FISHES.

Be it enacted, &c., as follows:

SECT. 1. In all cases where the Commissioners on Inland Fisheries have leased or shall hereafter lease any great ponds in this Commonwealth for the cultivation of useful fishes, the said Commissioners may fix the limits of such great ponds, and determine what arms, coves or bays of the same shall be regarded as part of said great ponds; and the limits of said great ponds, so fixed and determined by said Commissioners, and recorded in the registry of deeds for the county where such ponds lie, shall be taken to be the legal limits of said great ponds for all the purposes of such case. The expense of fixing and recording such limits shall be paid by the lessees.

SECT. 2. This Act shall take effect upon its passage. [*Approved May 4, 1877.*]

[D.]

RETURNS OF WEIRS, SEINES, AND GILL-NETS.

A good deal of pains was this year taken properly to distribute blanks among the fishermen, who were generally reached, with the exception of the Cape Ann region, where there are no weirs, but a certain number of purse-seiners and gill-netters who did not apply for blanks.

The following heading was attached to each blank, which was divided into columns for the different species of fish : —

Your attention is called to the following Act, whereby you are required, on or before the first day of next October, to return to the Commissioners on Inland Fisheries this blank, which you are to fill with the numbers taken of each kind of fish specified at the *heads* of the columns, and according to the days of the month at the *sides* of the columns: —

[CHAP. 104.]

AN ACT REQUIRING CERTAIN RETURNS TO THE COMMISSIONERS ON INLAND FISHERIES.

Be it enacted, &c., as follows :

SECT. 1. The owner or owners of every pound. weir, or other similar fixed contrivance, or of any fishing-pier, seine, drag or gill net, used in any of the waters of this state for fishing-purposes, shall make written report, under oath, to the Commissioners on Inland Fisheries, on or before the first day of October in each year, specifying the number of each kind of edible fish caught by his or their respective pounds, weirs, or other similar fixed contrivances, piers, seines, drag or gill nets, during the year next preceding the date of said report.

SECT. 2. It shall be the duty of the Commissioners on Inland Fisheries to furnish each owner or proprietor of any pound, weir, or similar fixed contrivance, pier, seine, drag or gill net, on or before the fifteenth day of March in each year, with suitable blank forms for the report required by the preceding section, so arranged that each day's catch may be separately recorded thereon; and in filling out such reports, such owner or proprietor shall give the results of each day's fishing, so far as

practicable; and it shall be the duty of such owner or proprietor to apply to the Commissioners on Inland Fisheries for such blank forms.

SECT. 3. Whoever knowingly and wilfully violates any of the provisions of this Act shall be punished by a fine of not less than ten nor more than one hundred dollars.

SECT. 4. This Act shall take effect upon its passage. [*Approved April 6, 1876.*]

RETURN OF THE

[Here put what *kind*, whether seine, or pound, &c.]

..... Fishery of,
in the town of, from March 1 to September 15, 187 ,
showing the catch of each day's fishing.

| DATE. | Shad. | Alewives. | Sea Her- ring. | Striped Bass. | Scup. | Squeteague. | Mackerel. | Spanish Mackerel. | Bluefish. | Tautog. | Flounders and Flat Fish. | Menhaden. | Eels. |
|----------|-------|-----------|-------------------|------------------|-------|-------------|-----------|----------------------|-----------|---------|--------------------------------|-----------|-------|
| March 1. | | | | | | | | | | | | | |

Considering the novelty of the matter, and their want of experience, the fishermen deserve high praise for the pains they have taken. Of 64 weirs that received blanks, 56 made returns. Of these, 43 will be found on the map, indicated by numbers which correspond to those of Table I. The remaining 13 are referred to their towns, as their localities are not exactly known. To gill-nets, 188 blanks were issued, of whom 120 made returns. The others did not fish, or fished with companies, or failed to reply.

It cannot be expected that the tables which follow should be very accurate. Doubtless the returns were more or less reliable according to the pains and the intelligence of each fisherman; but, on the whole, the general nature of these fisheries in quantity and quality will be shown. Such statistics cannot fail to be most valuable for the interests of our fishermen, whose existence depends on a wise use of this gift of nature.

As population increases, game and fish decrease, and it is no longer allowable to destroy them at pleasure.

Then it is that laws are passed to protect wild creatures, and especially fishes, which are so important for food. Unfortunately this is one of the most difficult subjects for legislation; so that our fishery-laws of former days were usually the reflection of the ignorance and mutual jealousies of different sets of fishermen. Laws which are not founded on known facts command no respect, and

cannot be enforced ; and so it has fared with many of our fishery-laws.

What is the consequence? At every session of the Legislature thousands of dollars' worth of time is consumed in committee-hearings and public discussions of ill-considered local laws for the limitation of fishing. Every committee-hearing breeds one or two more at the following session, where the petitioners endeavor to undo the work of their predecessors ; so that to-day our statute books are encumbered with several hundred enactments, the greater part of which only go to make up a garment of shreds and patches. From time to time there is unusual excitement and waste of money. Thus, at the session of 1870, three thousand persons petitioned for a law to restrain fishing with weirs, seines, and gill-nets, while eight thousand names appeared as remonstrants.

The hearing occupied several weeks. The witnesses, for the most part, had weak knowledge and strong prejudices ; and what real information was to be had was violently pulled and twisted by the half-dozen able lawyers employed by the combatants.

The remonstrants of one portion only of Cape Cod contributed over three thousand dollars to defend their side. The petitioners had leave to withdraw, but neither party was convinced, for there was little testimony calculated to convince anybody.

Nothing came of it, therefore, but a loss of time and money to the amount of many thousands of dollars.

Is there no way of avoiding such waste? Is there no way of treating this vital trade of fishing as we treat other trades? Cannot we collect facts and statistics, and act on them just as leather dealers do, or cotton manufacturers, or iron founders? The Commissioners on Inland Fisheries think we can.

Already, in 1871, they made a beginning by hiring a weir, and causing a record to be made of its catch during one season. This experiment, which cost a few hundred dollars, gave more solid information than has come from all legislative hearings during the past ten years ; it did more than any hearing ever did, in this, that it *settled* one or two points.

The returns will furnish statistics of the numbers and the kinds of fish which visit our coast, of their favorite localities and modes of running, and of the proper time and manner of taking them. Continued through two or three seasons, these returns ought to furnish such a mass of information as should bar all expensive legislative hearings, and give a certain basis for just laws which shall aid and encourage the fisherman instead of fettering and annoying him. The problem is, *How many fish may be taken and leave enough for*

seed? The solution of this problem is deemed the most important that can be undertaken by the Commissioners.

But the fisherman must co-operate heartily and in his own interest. It is not so easy to get facts from a fisherman as from a farmer or a mechanic: his trade has something of the chance of the hunter. He is liable to come home empty-handed; and so when he does get an opportunity he likes to seize what he can. With his hunter character is mixed something of the sailor's carelessness; and so he is often averse to orderly procedure, and rather suspicious of any thing new. But luckily this is a matter for *Massachusetts* fisherman; and every *Massachusetts* man is expected to be reasonable and law-abiding, and ready to take a little trouble, that good may come to himself and his children.

The net fisheries for bluefish and mackerel were this year almost a failure in many places. Should next year prove one of abundance we shall have two sets of tables, giving the catches of a bad and of a good season.

It is, as yet, too early to make generalizations, or to lay down rules for the preservation and increase of our shore fisheries. One thing is plain, however, that on the two sides of Cape Cod and about Martha's Vineyard the fifty-six pounds take many times more fish than the one hundred and twenty gill-nets and the twenty-nine seines together. This will be seen on comparing the grand totals of the three sorts of apparatus for the more important fishes: —

| | Shad. | Alewives. | Sea Herring. | Striped Bass. | Scup. | Mackerel. | Bluefish. | Tautog. | Flat Fish. | Menhaden. |
|--------------|--------|-----------|--------------|---------------|---------|-----------|-----------|---------|------------|-----------|
| Weirs, . . | 11,953 | 1,046,719 | 888,213 | 1,773 | 225,420 | 1,368,335 | 136,319 | 13,932 | 85,582 | 1,770,136 |
| Gill-nets, . | 162 | 120,107 | 19,532 | 386 | 53,627 | 219,824 | 90,061 | 4,455 | 7,460 | 81,526 |
| Seines, . . | 131 | 71,611 | 233 | 395 | 697 | 3,080 | 47,513 | 31 | 1,166 | 600,198 |

On comparing Tables IV., V., and VI., it is seen that the little Taunton River, where some pains are taken to preserve the fish, actually *yielded more shad than either the Merrimac or the Connecticut*. Such have been the consequences of improvidence. The failure of the upper Connecticut does not seem to be the result of raising the Windsor Locks dam, for the fishery *below* the dam has also greatly diminished.

The attention of city and town officers is specially called to chapter 119, Acts of 1877, whereby they are empowered to *permit or to prohibit any weirs or pounds*.

TABLE NO. I. — POUNDS AND WEIRS.
Showing the Catch of each during 1877.

| No. on Map. | TOWN OR PLACE. | PROPRIETOR. | Shad. | Alwives. | Sea Herring. | Striped Bass. | Scup. | Squeteague. | Mackerel. | Spanish Mackerel. | Bluefish. | Tautog. | Flounders and Flat Fish. | Menhaden. | Eels. | Cod. | Dog Fish. |
|-------------|----------------|------------------|-------|----------|--------------|---------------|-------|-------------|-----------|-------------------|-----------|---------|--------------------------|-----------|-------|------|-----------|
| 30 | Barnstable, | George A. Smith, | No | return. | | | | | 10,780 | | 60 | 135 | | | | 98 | |
| | " | James P. Smith, | 31 | | | | | | 33,420 | | 363 | 26 | 768 | 2,046 | | | |
| 22 | West Brewster, | W. C. Parker, | 4 | 1,766 | 18 | 73 | | | 15,475 | | 606 | 41 | | 415 | 135 | | |
| 21 | Brewster, | F. Atwood, | 24 | 2,864 | | 68 | | | 234,164 | | | 16 | 568 | 25,319 | | | |
| | " | T. I. Ellis, | 1,466 | 39,150 | 14,200 | | | | 19 | | 2 | 44 | | | | | |
| 24 | East Brewster, | E. Cahoon, | 9 | 500 | | 5 | | | 854 | | 2,725 | | | | | | |
| 26 | " | G. Eldredge, | 8 | 150 | 24 | 18 | | 50 | | | 467 | 217 | 226 | | 340 | | |
| 23 | " | T. Ellis, Jr., | 22 | | 1,075 | | | | 4,700 | | 1,003 | 18 | 1,630 | | 35 | | |
| 25 | " | Z. Rogers, | | 1 | | 9 | | | 1,416 | | 394 | 15 | 2 | 4 | 31 | | |
| 14 | Orleans, | I. Hopkins, | | | | | | | 7,867 | | 3,708 | | | | | | |
| 13 | " | G. S. Nickerson, | 13 | 95 | | 71 | | | 6,871 | | 5,153 | 203 | 3 | 1,750 | | | |
| 15 | " | J. Walker & Co., | | | | | | | | | 255 | | | | | | |
| 16 | Eastham, | W. H. Nickerson, | 17 | | | 2 | | | 37,058 | | 10,621 | 54 | | 5,500 | | | |
| | " | J. Savage, | | 13,000 | 48,000 | | | | 8,900 | | | 525 | 15,500 | 22,400 | | | |
| 17 | " | N. S. Smith, | 17 | 90 | | 31 | | | 3,927 | | 11,982 | 228 | 1,173 | 2,630 | | | |
| | " | L. H. Walker, | 25 | 192 | 2,100 | 80 | | | 10,266 | | 14,682 | 2 | 3 | 5,150 | | | |

| No | North Eastham, | I. Horton, | No | return. |
|----|----------------|-----------------------|-------|-----------------|
| 19 | " " | J. W. Lincoln, | 7 | - |
| 18 | " " | P. Smith, | 14 | 1,620 85,800 |
| | Wellfleet, | J. W. Lincoln, | - | - |
| | North Truro, | C. H. Collins, | - | - |
| 9 | Chatham, | S. F. Bearse, | 1,036 | 253,320 |
| 11 | Monomoy, | G. F. Harding, | - | 205 |
| 10 | " " | F. Lamphear, | No | return. |
| 7 | " " | Reed, Loveland & Co., | 5,439 | 214,604 443,842 |
| 8 | " " | G. W. Reynolds, | 641 | 50,394 182,700 |
| 5 | " " | J. N. Eldredge, | 679 | 15,000 - |
| 6 | " " | L. Eldredge, | 777 | 6,551 - |
| | " " | J. Eldredge, | - | - |
| 3 | Harwichport, | R. Chase, | 33 | 5,470 - |
| | " " | B. G. Phillips, | 549 | 10,084 - |
| 2 | " " | W. B. Kelley, | No | return. |
| | West Harwich, | G. W. Chase, | - | - |
| 4 | Harwichport, | D. F. Weeks, | 13 | 175 4,310 |
| 27 | Dennis, | L. Hall, | 4 | - |
| | " " | Z. Bearse, | - | - |
| 1 | West Dennis, | Z. Baker,* | 362 | 8,135 22,491 |
| 29 | Barnstable, | B. Lovell, | 5 | 510 1,100 |

* Also with gill-nets.

| | | | | |
|------------------|-------------------------------------|---------------------|---|---|
| 54 | So. Dartmouth, . | J. S. Cook, . | . | No return. |
| 53 | " " | Joseph Manuel, . | . | return. |
| 52 | " " | William Matthews, . | . | - |
| 35 | Menemsha Bight, | P. M. Stuart, . | . | 19 47,685 |
| 34 | Gay Head, . | A. Smith & Co., . | . | 139 22,425 |
| 31 | { Robinson's Hole, Naushon, } | J. K. Tilton, . | . | No return. |
| | Tisbury, . | T. E. Norton, . | . | 21 5,371 |
| 37 | " " | T. Cottle, . | . | 18 - |
| 36 | Menemsha Bight, | J. Luce, . | . | 3 - |
| 32 | Chilmark, . | B. A. Norton, . | . | No return. |
| 33 | Lambard Cove, . | E. Cottle, . | . | - 8,500 |
| | Lanesville, . | J. J. Woodbury, . | . | No return. |
| | Gosnold, . | L. A. Luce & Co., . | . | 9 950 |
| Total, | | | | 11,953 1,046,719 888,213 1,773 225,420 12,796 1,368,835 25 136,319 13,932 85,582 1,770,136 1,273 98 200 |

* Also with gill-nets.

TABLE No. II. — SEINES.
Showing the Catch of each for 1877.

| Town or Place. | Proprietor. | Shad. | Alewives. | Sea Herring. | Striped Bass. | Scup. | Squeteague. | Mackerel. | Spanish Mackerel. | Bluefish. | Tautog. | Flounders and Flat Fish. | Menhaden. | Eels. | Hickory Shad. | Frost Fish. | Perch. | Smelts. |
|----------------|-------------------|-------|-----------|--------------|---------------|-------|-------------|-----------|-------------------|-----------|---------|--------------------------|-----------|-------|---------------|-------------|--------|---------|
| Barnstable, | O. Lambert, | 3 | | | 89 | 134 | | | | 637 | | | 10,284 | 183 | 24 | | | |
| " | A. Nickerson, | | | 24 | 181 | 134 | | | | 1,831 | | 558 | | | | | | |
| " | D. & F. Rogers, | 7 | | | 123 | | | | | 458 | | 6 | | | | | | |
| Taunton, | W. Dill, | | | | | | | | | 2,445 | | | | | | | | |
| " | H. L. Knowles, | 60 | | | | | | | | 2,800 | | | 1,175 | | | | | |
| " | W. O. Knowles, | 8 | 885 | | | | | 1,529 | | 3,847 | | | | | | | | |
| " | J. Phillips, | | | | | | | 1,057 | | 3,208 | | | | | | | | |
| " | C. H. Smith, | | | | | | | 400 | | 3,553 | | | | | | | | |
| Truro, | S. S. Lewis, | | | | 2 | | | | | 421 | | 13 | | | | | | |
| Chatham, | E. K. Hensley, | | | | | | | | | 1,503 | | | | | | | | |
| Harwich, | R. Chase, | | | | | | | | 4 | 1,403 | | | | | | | | |
| Dennis, | N. Kelley, | | 20,400 | | 2 | | | 1 | | 17,415 | | | 12,000 | | | | | |
| " | J. Pierce, | | | | | | | | | 692 | | | | | | | | |
| Yarmouth, | D. Baker, | 10 | 19,036 | | 17 | | | 3 | | 637 | | | | | | | | |
| " | H. Baker, | | 13,238 | | | | | | | | | | | | | | | |
| Hyannis, | Sherman & Loring, | | | | | 455 | | | | 1,730 | 23 | | 340 | | | | | |

| | | | | | | | | | | | | | | | | | | | |
|---------------|--------------------|-----|---|---|---|-----|-----|---|-------|---|--------|-------|---------|---------|-------|-----|-------|-------|-------|
| Hyannis Port, | B. F. Lambert, | . | . | . | . | 96 | - | - | - | - | 2,412 | - | - | - | - | - | - | - | - |
| Marshpee, . | S. P. Pells, | . | . | . | . | - | - | - | - | - | 1,469 | - | - | - | - | - | - | - | - |
| Westport, . | Z. Almy, | . | . | . | . | - | - | - | - | - | - | 9,000 | - | - | - | - | - | - | - |
| " . | J. Lorton, | . | . | . | . | 1 | - | - | - | - | - | 105 | 8 | - | - | - | - | - | - |
| " . | J. Smith, | . | . | . | . | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
| So. Westport, | S. G. Allen, | . | . | . | . | - | - | - | - | - | - | 1 | 400 | 10 | - | - | 490 | - | 73 |
| " " | J. W. Gifford, | . | . | . | . | - | - | - | - | - | 115 | - | 510,000 | - | - | - | - | - | - |
| " " | Jon. Gifford, | . | . | . | . | - | - | - | - | - | 225 | - | 48,750 | - | - | - | - | - | - |
| " " | P. G. Potter, | . | . | . | . | 7 | 1 | - | - | - | - | 2 | 4,363 | - | - | - | 317 | - | - |
| " " | L. Tripp, | . | . | . | . | 12 | - | - | - | - | 1 | 5 | 95 | - | - | - | 607 | 2,797 | - |
| " " | P. S. Tripp, | . | . | . | . | 20 | - | - | - | - | - | 2 | 2,344 | 2,823 | - | 737 | 1,488 | 4,887 | - |
| " " | L. White, | . | . | . | . | 19 | - | - | - | - | - | - | 1,355 | 28 | - | - | 382 | 3 | - |
| Nantucket, . | G. Phinney & Co.,* | . | . | . | . | - | - | - | - | - | 821 | - | 7 | - | - | - | - | - | - |
| Total, . | | 131 | | | | 395 | 695 | 1 | 3,080 | 4 | 47,513 | 31 | 1,166 | 600,198 | 3,052 | 24 | 737 | 3,284 | 7,760 |

* Also with gill-nets.

TABLE No. III. — GILL-NETS.
Showing the Catch of each for 1877.

| TOWN OR PLACE. | PROPRIETOR. | Shad. | Alewives. | Sea-Herring. | Striped Bass. | Scup. | Squeteague. | Mackerel. | Spanish Mackerel. | Bluefish. | Tautog. | Flounders and Flat Fish. | Menhaden. | Bels. |
|----------------|-------------------|-------|-----------|--------------|---------------|-------|-------------|-----------|-------------------|-----------|---------|--------------------------|-----------|-------|
| Orleans, | S. Linell, | . | . | . | 13 | . | . | . | . | 1,438 | . | . | 3,850 | . |
| " | W. E. Smith, | . | . | . | . | . | . | 871 | . | 415 | 3 | . | . | . |
| " | Jabez Sparrow, | . | . | . | . | . | . | 249 | . | 1,259 | 11 | . | . | . |
| Eastham, | R. Doane, | . | . | . | 31 | . | . | 247 | . | 2,437 | 9 | 111 | . | . |
| " | L. Lombard,* | . | . | . | . | . | . | 221 | . | 4,647 | . | . | . | . |
| " | J. Nickerson, | . | . | . | . | . | . | 105 | . | 1,055 | . | . | . | . |
| " | Myrick Nickerson, | . | . | . | . | . | . | 319 | . | 1,478 | . | . | . | . |
| " | J. Penniman, | . | . | . | . | . | . | 2,180 | . | 5,962 | . | . | . | 745 |
| " | A. Smith,* | . | . | . | . | . | . | 72 | . | 5,542 | 3 | 31 | . | . |
| Wellfleet, | E. Baker, | . | . | . | . | . | . | . | . | . | . | . | 300 | . |
| " | H. Graham, | . | . | . | . | . | . | . | . | . | . | . | 9,600 | . |
| " | G. Graham, | . | . | . | . | . | . | 820 | . | . | . | . | . | . |
| " | A. F. Gross, | . | 875 | . | . | . | . | 420 | . | . | . | 350 | . | . |
| " | Z. Lanman, | . | . | . | . | . | . | 400 | . | . | . | . | 9,800 | . |
| Wellfleet, | C. Y. Rogers,. | . | 110 | 211 | . | 5 | 1 | 18,451 | . | . | . | 6 | 27,891 | 54 |
| South Truro, | E. Collins, | . | . | . | . | . | . | 373 | . | 44 | . | . | . | . |

[illegible]

* Also with seines.

TABLE No. III. — GULL-NETS — Continued.

| Town on Place. | Proprietor. | Shad. | Alwives. | Sea Herring. | Striped Bass. | Scup. | Squeteague. | Mackerel. | Spanish Mackerel. | Bluefish. | Tautog. | Flounders and Flat Fish. | Menhaden. | Eels. |
|----------------|---------------------|-------|----------|--------------|---------------|-------|-------------|-----------|-------------------|-----------|---------|--------------------------|-----------|-------|
| Provincetown, | J. B. Dyer, | 1 | 1 | 1 | 1 | 1 | 1 | 2,235 | 1 | 1 | 1 | 1 | 1 | 1 |
| " | W. Dyer, | 1 | 97 | 1 | 1 | 1 | 1 | 1,963 | 1 | 1 | 1 | 1 | 1 | 1 |
| " | E. E. Emery, | 1 | 109 | 405 | 1 | 1 | 1 | 4,984 | 1 | 1 | 1 | 33 | 117 | 1 |
| " | M. Francis, | 1 | 1 | 636 | 1 | 1 | 1 | 1,281 | 1 | 791 | 1 | 112 | 1 | 1 |
| " | " | 100 | 1 | 8,376 | 5 | 11 | 1 | 6 | 1 | 34 | 1,325 | 2,217 | 83 | 1 |
| " | John E. Freeman, | 1 | 1 | 1 | 1 | 1 | 1 | 2,040 | 1 | 1 | 1 | 1 | 1 | 1 |
| " | P. Freeman, | 1 | 746 | 1 | 1 | 1 | 1 | 5,940 | 1 | 611 | 1 | 1 | 1,200 | 1 |
| " | J. Ghenn, | 1 | 1 | 1 | 1 | 1 | 1 | 426 | 1 | 143 | 1 | 1 | 1 | 1 |
| " | J. C. P. Harvender, | 2 | 60 | 535 | 1 | 1 | 1 | 14,030 | 1 | 1 | 1 | 442 | 4,255 | 1 |
| " | L. B. Kelley, | 1 | 1 | 1 | 1 | 1 | 1 | 3,342 | 1 | 1 | 1 | 1 | 1 | 1 |
| " | B. Lewis, | 1 | 1 | 2,898 | 1 | 1 | 1 | 14,663 | 1 | 30 | 1 | 1 | 536 | 1 |
| " | G. Lewis, | 1 | 1 | 1 | 1 | 1 | 1 | 3,241 | 1 | 63 | 1 | 1 | 1 | 1 |
| " | I. Lewis, | 1 | 1 | 1 | 1 | 1 | 1 | 810 | 1 | 1,588 | 1 | 1 | 1 | 1 |
| " | T. Lewis, | 1 | 1 | 1 | 1 | 1 | 1 | 3,916 | 1 | 492 | 1 | 1 | 1 | 1 |
| " | Alph Mayo, | 1 | 1 | 1 | 1 | 1 | 1 | 3,017 | 1 | 659 | 1 | 1 | 1 | 1 |
| " | I. Mayo, | 1 | 1 | 1 | 1 | 1 | 1 | 6,440 | 1 | 951 | 1 | 1 | 1 | 1 |
| " | J. D. Mayo, | 1 | 1 | 1 | 1 | 1 | 1 | 5,563 | 1 | 1,651 | 1 | 1 | 1 | 1 |

| | | | | | | | | | | | | | |
|----------|------------------|---|---|---|---|------|---|--------|-------|---|----|-------|---|
| | Joseph Mayo, | . | . | . | . | . | . | 11,988 | 225 | - | - | - | - |
| " | R. N. Mayo, | . | . | . | . | . | . | 1,272 | - | - | - | - | - |
| " | William Newcomb, | . | . | . | . | . | . | 2,606 | - | - | - | - | - |
| " | F. A Paine, | . | . | . | . | .232 | . | 796 | 964 | - | - | - | - |
| " | T. K. Paine, | . | . | . | . | 5 | . | 8,066 | 326 | - | - | 25 | - |
| " | R. Ryder, | . | . | . | . | . | . | 1,001 | 115 | - | - | - | - |
| " | J. Sears, | . | . | . | . | 600 | . | 1,108 | 474 | - | - | 700 | - |
| " | I. Small, | . | . | . | . | 719 | . | 1,031 | 898 | - | - | - | - |
| " | H. Smith, | . | . | . | . | . | . | 1,007 | 363 | - | - | - | - |
| " | W. C. Snow, | . | . | . | . | .229 | . | 3,581 | 537 | - | 50 | - | - |
| " | T. Sparks, | . | . | . | . | 880 | . | 233 | - | - | - | - | - |
| " | J. Sparrow, | . | . | . | . | . | . | 1,404 | - | - | - | - | - |
| " | J. Swift, | . | . | . | . | . | . | 8,030 | 123 | - | - | - | - |
| " | R. Swift, | . | . | . | . | . | . | 4,947 | 245 | - | - | - | - |
| " | F. Tyler, | . | . | . | . | . | . | 2,884 | - | - | - | - | - |
| " | R. Wareham, | . | . | . | . | . | . | 2,512 | 54 | - | - | 2,450 | - |
| " | William Whalen, | . | . | . | . | 700 | . | 2,226 | - | - | - | - | - |
| " | J. G. Weeks, | . | . | . | . | .275 | . | 3,273 | - | - | - | 1,050 | - |
| " | Joseph E. Weeks, | . | . | . | . | . | . | 6,856 | 72 | - | - | - | - |
| Chatham, | W. Bearnse, | . | . | . | . | . | . | 4,470 | - | - | - | - | - |
| " | A. Bloomer, | . | . | . | . | . | . | 1,328 | 1,443 | - | - | - | - |
| " | N. Eldredge, | . | . | . | . | . | . | 492 | - | - | - | - | - |

TABLE No. III. — GULL-NETS — Continued.

| TOWN OR PLACE. | PROPRIETOR. | Shad. | Alewives. | Sea Herring. | Striped Bass. | Scup. | Squeteague. | Mackerel. | Spanish Mackerel. | Bluefish. | Tautog. | Flounders and Flat Fish. | Menhaden. | Eels. |
|------------------|----------------------|-------|-----------|--------------|---------------|-------|-------------|-----------|-------------------|-----------|---------|--------------------------|-----------|-------|
| Chatham, . | Neh. Eldredge, . | . | . | . | . | . | . | 360 | . | . | . | . | . | . |
| " | J. Gill, . | . | 178 | . | . | . | . | 981 | . | . | . | . | . | . |
| " | A. Harding, . | . | . | . | . | . | . | 1,026 | . | . | . | . | . | . |
| " | C. Howes, . | . | 74 | . | . | . | . | 365 | . | . | . | . | . | . |
| " | B. Kendrick, . | . | . | . | . | . | . | 1,226 | . | . | . | . | . | . |
| " | R. Mallett, . | . | . | . | . | . | . | 2,247 | . | . | . | . | . | . |
| " | Mallows & Tripp, . | . | . | . | . | . | . | . | . | 1,292 | . | . | . | . |
| " | Seth Mallows, . | . | . | . | . | . | . | 3,770 | . | . | . | . | . | 292 |
| " | E. Patterson, . | . | . | . | . | . | . | 883 | . | . | . | . | . | . |
| " | William Patterson, . | . | . | . | . | . | . | 3,050 | . | . | . | . | . | . |
| " | J. F. Smith, . | . | . | . | . | . | . | 774 | . | . | . | . | . | . |
| South Chatham, . | O. Eldredge, . | . | . | . | . | . | . | 222 | . | . | . | . | . | . |
| Harwich, . | T. Ellis, . | . | . | . | . | . | . | 584 | . | 1,090 | . | . | . | . |
| " | J. Oliver, . | . | . | 145 | . | 1,850 | . | 649 | . | 3,328 | . | . | . | . |
| " | E. Snow, . | 1 | . | . | . | . | . | 3 | . | 1,052 | . | . | . | . |
| Dennisport, . | F. Crowell, . | . | . | . | . | . | . | . | . | 172 | . | . | . | 1,219 |
| " | N. C. Eldredge, . | . | . | . | . | . | . | . | . | 442 | . | . | . | . |

| | | | | | | | | |
|--------------|----------------------|---|---|---|---|---|---|---|
| Dennisport, | F. Joseph, | . | . | . | . | . | . | . |
| " | A. Howland, | . | . | . | . | . | . | . |
| West Dennis, | L. Crowell, | . | . | . | . | . | . | . |
| " | V. Kelley, | . | . | . | . | . | . | . |
| Hyannis, | D. Bearse, | . | . | . | . | . | . | . |
| Hyannisport, | W. F. Carney, | . | . | . | . | . | . | . |
| " | H. C. Lambert, | . | . | . | . | . | . | . |
| Centreville, | C. E. Bearse, | . | . | . | . | . | . | . |
| " | Toilston Fuller, | . | . | . | . | . | . | . |
| " | William Hallett, | . | . | . | . | . | . | . |
| " | T. Kelley, | . | . | . | . | . | . | . |
| " | T. F. Phinney, | . | . | . | . | . | . | . |
| " | M. Sturges & Son, | . | . | . | . | . | . | . |
| Cotuitport, | J. Hendren, | . | . | . | . | . | . | . |
| " | C. Nickerson, | . | . | . | . | . | . | . |
| " | D. Nickerson, | . | . | . | . | . | . | . |
| " | S. Nickerson, | . | . | . | . | . | . | . |
| Falmouth, | E. H. Davis, | . | . | . | . | . | . | . |
| " | H. G. Fisher & Co., | . | . | . | . | . | . | . |
| " | R. H. Handy,* | . | . | . | . | . | . | . |
| " | W. Small, | . | . | . | . | . | . | . |
| Fairhaven, | J. C. & J. J. Allen, | . | . | . | . | . | . | . |

* Also with scines.

TABLE No. III. — GILL-NETS — Concluded.

| TOWN OR PLACE. | PROPRIETOR. | Shad. | Alewives. | Sea Herring. | Striped Bass. | Scup. | Squeteague. | Mackerel. | Spanish Mackerel. | Bluefish. | Tautog. | Flounders and Flat Fish. | Menhaden. | Fels. |
|------------------|-------------------------------|-------|-----------|--------------|---------------|--------|-------------|-----------|-------------------|-----------|---------|--------------------------|-----------|-------|
| Fairhaven, . | S. P. Dunn, & G. Hiller, . | - | 50,881 | - | 30 | 5,699 | 4 | 22 | 184 | 2,650 | 1,298 | 1,089 | 1,830 | 48 |
| " . | B. T. Dunn, & S. A. Hiller, . | 23 | 23,212 | - | 11 | 44,991 | 65 | 4 | - | 570 | 572 | 662 | 4,615 | 68 |
| " . | C. D. Sherman, . | 3 | 8,368 | - | 5 | 24 | 15 | 26 | - | 13 | 1,055 | 1,214 | 6,374 | 151 |
| Nantucket, . | C. E. Snow, . | - | 28,103 | - | - | - | - | 17 | - | 1,494 | - | - | - | - |
| Total, | | 162 | 120,107 | 19,532 | 386 | 53,627 | 477 | 219,824 | 213 | 90,061 | 4,455 | 7,400 | 81,526 | 2,865 |

TABLE NO. IV. — CONNECTICUT RIVER SEINES.

| TOWN. | NAME. | Shad. | Striped Bass. | Black Bass. | Pike. | Suckers. | Sturgeon. |
|---------------------|--------------------|-------|---------------|-------------|-------|----------|-----------|
| Agawam, . . | A. Convers, . . | 283 | — | 4 | — | — | — |
| “ . . | A. J. Hills, . . | 64 | — | — | — | — | — |
| So. Hadley Falls, . | C. C. Smith, . . | 2,674 | 2 | — | 1 | — | — |
| “ “ “ . . | A. Ingraham, . . | 738 | 8 | — | — | 16 | 21 |
| Chicopee, . . | J. & H. W. Chapin, | 421 | — | — | — | — | — |
| West Springfield, . | G. White, . . | 546 | — | — | — | — | — |
| Springfield, . . | J. O'Leary, . . | 77 | — | — | — | — | — |
| “ . . | R. Cooley, . . | 1,008 | 1 | — | — | — | — |
| “ . . | R. Parker, . . | 692 | — | — | — | — | — |
| | | 6,503 | 11 | 4 | 1 | 16 | 21 |

TABLE NO. V. — MERRIMAC RIVER SEINES.

| TOWN. | NAME. | Shad. | Alewives. | Striped Bass. |
|-------------------|--------------------|------------|-----------|---------------|
| Andover, North, . | W. H. Day, . . | 797 | — | — |
| “ “ . . | A. C. Hardy, . . | No return. | — | — |
| “ “ . . | W. A. Wiley, . . | 23 | — | — |
| Bradford, . . | D. W. Gage, . . | No return. | — | — |
| “ . . | H. Nesbet, . . | 347 | — | 44 |
| Haverhill, . . | T. Bailey, . . | No return. | — | — |
| “ . . | Dempsey, . . | 1 | 1,500 | — |
| “ . . | W. P. Goodwin, . . | 800 | — | 4 |
| “ . . | Chas. Ordway, . . | No return. | — | — |
| Groveland, . . | T. H. Balch, . . | 429 | — | 3 |
| “ . . | Chas. Pemberton, . | No return. | — | — |
| Amesbury, . . | J. Morrill, . . | 2,636 | — | 2 |
| Newburyport, . . | J. H. Worthen, . . | No return. | — | — |
| | | 5,033 | 1,500 | 53 |

TABLE NO. VI. — TAUNTON RIVER SEINES.

| TOWN. | NAME. | Shad. | Alewives. | Striped Bass. |
|---------------------|--------------------|------------|-----------|---------------|
| Berkley, . . | I. N. Babbitt, . | 917 | 150,617 | — |
| “ . . | Nichols & Shove, . | 930 | 37,627 | 100 |
| Dighton, . . | N. Chase, . . | 732 | 109,436 | 72 |
| “ . . | I. Sherman, . . | 762 | 94,250 | — |
| “ . . | Chas. Simmons, . | No return. | | |
| “ . . | Chas. N. Simmons, | 600 | 80,000 | — |
| | | 1,100 | 180,000 | — |
| | | 15 | 1,000 | — |
| “ . . | J. C. Standish, . | 327 | 59,952 | — |
| Somerset & Dighton, | G. H. Simmons, . | 3 | 34,696 | 1 |
| “ “ | J. Gibbs, . . | 100 | 82,200 | — |
| Middleborough, . | R. Hathaway, . | — | 117,486 | — |
| Raynham, . . | G. B. Williams, . | 581 | 174,383 | — |
| | | 380 | 109,911 | — |
| Taunton, . . | J. W. Hart, . . | 338 | 139,840 | — |
| “ . . | R. W. Rouns ville, | 523 | 126,060 | — |
| | | 7,308 | 1,497,458 | 173 |

TABLE NO. VII. — OTHER FRESH WATER SEINES.

| TOWN. | NAME. | Shad. | Alewives. | Striped Bass. | White Perch. | Smelts. | Tom Cod, or Frost Fish. |
|---------------------------|------------------|-------|-----------|---------------|--------------|---------|-------------------------|
| Mattapoisett & Rochester, | N. Hammond, . | 3 | 347,124 | — | — | — | — |
| Falmouth, . . | E. E. Winch, . . | — | 16,400 | — | — | — | — |
| Plymouth, . . | W. S. Hadaway, | — | — | — | — | — | 10,950 |
| Barnstable, . . | C. Lincoln, . . | — | 165,970 | — | — | — | — |
| “ . . | A. Lovell, . . | — | 9,830 | — | — | — | — |
| Wellfleet, . . | G. Baker, . . | — | 21,205 | — | — | — | — |
| Yarmouth and Dennis, | N. W. Grush, . . | — | 355,102 | — | 22,462 | — | — |
| Tisbury, . . | A. Look, . . | — | 344,000 | 10 | 4,500 | 1,000 | — |
| | | 3 | 1,259,631 | 10 | 26,962 | 1,000 | 10,950 |

TABLE NO. VIII. — SEINE FISHERY AT MOUTH OF THE MERRIMAC.

| NAME. | Menhaden. |
|--|-----------|
| E. Thurlow, R. Pierce, B. M. Perkins, W. H. H. Perkins, N. Lattime, B. Stevens, | 2,013,675 |

Fishing with seines in the Merrimac, at the season when the menhaden stand in, is forbidden by law. The *mouth* of the river, has, however, never been defined by the Governor, as permitted by statute; and it was represented to the Commissioners that valuable menhaden fisheries existed in this neutral ground of brackish water. Therefore, under the personal promise of the fishermen to capture no shad or salmon, and with the guarantee of responsible persons in Newburyport, the Commissioners agreed to defer the definition of the river-mouth, and to assume that these menhaden were not positively included in the river proper.

[E.]

The following petition is curious, as showing the interest in fisheries nearly a century ago, and from the fact that the original is in the writing of Fisher Ames.

Gentlemen :—

A number of persons of this and the neighboring towns, having voluntarily associated themselves together, for the purpose of adopting and pursuing the best means of restoring the passage of the salt-water fish up Charles River, have appointed a committee of their body to communicate, without reserve, to the towns and persons interested in the same object, the arguments and the prospects of a common benefit on which their opinions and their hopes are rested.

That committee, accordingly, beg your permission to state the sentiments of their body, as perspicuously and concisely as they can, expecting that the plain importance of the subject to your town will at once suggest their apology, and engage your attention and concurrence.

It was at first proposed to dig a canal on the Needham side of the great fall. But this scheme, upon deliberation and a view of the place, was rejected; for these among other reasons : because of the expense of labor and money to dig the canal, and because the natural bed of the river affords a much better passage. In pursuance of this opinion, a petition, on behalf of some towns and a large number of individuals, was presented to the General Court at their last session, praying that they would take such measures in the premises as their wisdom should direct.

The petition was committed to a very respectable Committee of both Houses, who will take a view of the river, and report.

We beg leave to make some observations to show that our project is not only practicable, but easy, and that the accomplishing of it will be highly beneficial to the inhabitants of the extensive tract of country through which the river and its numerous branches flow. However, we can barely touch upon the subject, and we shall leave it to your own reflections and inquiries to pursue the discussion.

The salt-water fish formerly ascended Charles River. This is proved by the uniform tenor of recent tradition; by the fondness of the Indians for their fishery at Natick, which the scarcity and meanness of the fish now found in the river could neither excite nor gratify; by the reservations and grants in ancient deeds of the fishing-grounds of the river; by the name of a bridge in Sherburn, still called Bass bridge from the an-

nual passage of those fish; by the well-attested fact that salmon have been taken in Wrentham within seventy years, and that their ascent was stopped by the dams; by the testimony of old people, upon oath; and by the resort of cod, haddock, &c., to the very wharves in Boston, where they were formerly caught in great numbers, so long as the small fish, whom they pursue and feed upon, could pass the falls, but which have retired further into the sea since the dams have stopped the small fish. And more than all, any person who has seen salmon and other fish ascend the falls of other rivers must be satisfied, upon a view of this river and falls, that, before their passage was impeded by artificial obstructions such fish did ascend, and that by the removal of such obstructions they would re-ascend. For if they formerly passed, why should they not pass in future? The removal of the dams and a single rock at the great fall in Newton, and at a trifling expense, would invite still greater shoals of fish than ever passed in former times, by rendering their passage more easy than formerly. It is the business of the Court's Committee to consider the best expedients for improving the fish passage. We therefore only hint at the improvements, which we are of opinion a very little labor will accomplish.

We proceed to consider some objections:—

The Expense.—This objection was urged with some reason against digging a canal. But it cannot apply to the scheme of the petitioners, who argue that the natural bed of the river will afford a fish-passage without any expense or labor, and that a very little labor will improve it sufficiently. Those who urge this objection adopted it while it was intended to dig the canal; and they still maintain it, being ignorant that that proposal is relinquished. It is also to be considered that the petitioners do not oblige themselves to expend a single shilling to improve the fish-passage. They petition for *leave* to do as they shall think fit, after the petition shall be granted. Those who shall content themselves with the passage as nature made it, will not incur any expense; and those who would improve it, a very small expense.

It is said the millers will not consent to have fishways made through their dams. We answer that they cannot prevent it. No men can have a right to do *wrong*.

The course of Charles River is slow. The mill-ponds are raised by flooding large, and, in some cases, immense tracts of meadow. The soil becomes rotten, spongy, unproductive, and even subject (in consequence of flooding) to excessive drought. The air is filled with unpleasant and unwholesome fresh-water steams. May, then, a few millers assert and establish a right, not only to deprive thousands of the precious and common benefits of nature in the fish, but to infect the air with pestilence, and to curse the soil with barrenness? But the law has directed the millers to leave a passage for the fish, which is a sufficient answer to this objection.

It is scarcely necessary to observe that the success of this attempt would be highly beneficial.

The largeness of the river, its long and very winding course, the great number of brooks and streams which fall into it, the noble and exten

sive ponds which feed the river, particularly in Dedham, Needham, Natick, Sherburn, Medway, Holliston, Franklin, and Wrentham, afford a prospect of advantage to a greater number of people, and in a much greater degree, than any river which has been opened by law in the Commonwealth. To this we may add that it is highly probable that the fish will follow the stream of the mill-creek in Dedham, and, by ascending the River Neponset, impart a share of this extensive benefit to the inhabitants of the towns upon that river. Considering these several circumstances, it is to be doubted whether any river from the Merrimack quite to Connecticut River possesses so many natural advantages to allure the ascent of the fish, of the noblest kinds, and in the greatest abundance.

To increase the fish in and near Boston harbor, to excite reward and feed industry in the country, to furnish the towns with a fund to pay their taxes and sustain their poor, are objects of such acknowledged importance that a practical success in the pursuit of them will at once vindicate our zeal and recompense our exertions.

But we may not enlarge upon the subject. These are the reasonings which have produced conviction in our minds. Therefore we submit them to your good sense, with this remark: that those who are to receive these benefits ought to unite in a petition to the General Court, to express their sense of the importance of them, and of their right to the enjoyment of them. As the river in your town is so narrow that the fish may be taken very easily, and your ponds afford you a prospect of more than a common share of advantage, we might have expected to find you at the head of the petitioners. After the petition shall be granted, all or any of the petitioners may decline a share of any labor or expense. But some regard will be had, perhaps, to this circumstance in forming the law which shall regulate the taking of the fish, whereby those who shall neglect to petition shall receive a very small share of the advantage.

It is our wish, gentlemen, to cultivate a good understanding with all those who, certainly, have a common interest with us in the success of our petition; and that your town should unite with others in a petition to the General Court the next session, or afford us your counsels and assistance in such other way as you shall best approve. If you think proper, you will lay this subject before your town for them to act upon it.

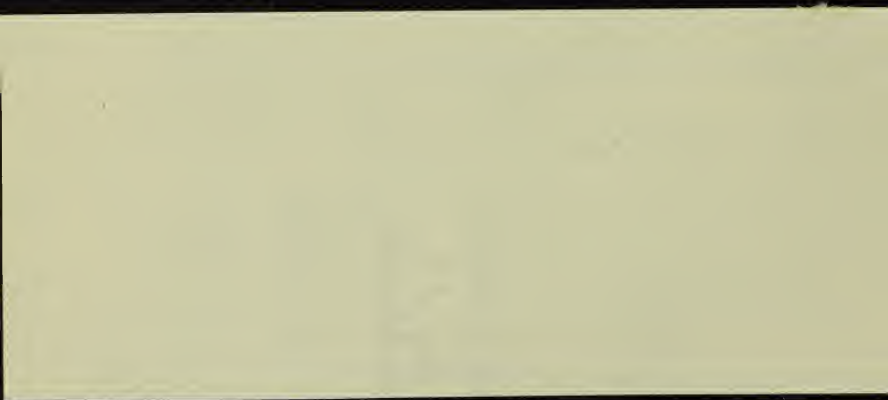
We are, Gentlemen, with all respect,

Your most obedient, humble servants.

DEDHAM, 23d Dec., 1785.

Compliments of

E. A. Brackett.



THIRTEENTH ANNUAL REPORT

OF THE

COMMISSIONERS

ON

INLAND FISHERIES,

FOR THE

YEAR ENDING SEPTEMBER 30, 1878.

BOSTON :

Band, Aberg, & Co., Printers to the Commonwealth,

117 FRANKLIN STREET.

1879.

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Commonwealth of Massachusetts.

To His Excellency the Governor and the Honorable Council.

THE Commissioners on Inland Fisheries beg leave to present their Thirteenth Annual Report.

FISHWAYS.

Westfield River.

At the first dam, owned by J. L. Worthy, a portion of the structure, which is very low at one side, has been cut away, and alterations made, so as to give the fish an easy passage over it.

At the second dam, belonging to the Agawam Canal Company, an excellent fishway has been built, and is now in good running order.

The third one, belonging to the same company, is a very low dam, used principally for storage at night in seasons of drought. A little care in regulating the gate would obviate the necessity of a fishway at this place. Mr. William K. Baker, treasurer of the company, has given assurance that it shall receive proper attention, and that there shall be no impediment here to the passage of fish.

This opens the river as far as Westfield. Above here are 4 dams ranging from 4 to 16 feet in height: namely, Samuel Horton, Westfield; Crane Brothers, Westfield; Manufacturers' Corporate Company, Westfield; The Pultz & Walkley Company, Westfield.

All of these parties have been informally notified that they will be required to build suitable passes over their dams; and an early completion of them will be insisted upon.

When they are finished, the people of Westfield, who are quite alive to the interests of fish-culture, will have ample

room to exercise their reserve strength in stocking the river, thereby restoring to the inhabitants what they have been so long deprived of.

Nashua River.

The two large dams at Nashua have each been provided, this season, with a fishway of the same dimensions as the one now in use at Lawrence.

Above Nashua, in that part of the river flowing through this State, are some obstructions which will require attention early next season. What they are, will be seen by the following careful report made by Mr. J. L. S. Thompson.

LANCASTER, NOV. 23, 1877.

To Fish Commissioners of Massachusetts.

Notes of Survey of Nashua River, in open boat, from Lancaster to Nashua, Nov. 12, 1877:—

The first point to notice is at Mitchell's Mills, below Shirley, about a mile and a half above Ayer Junction. The mill was recently burnt, and the dam broken, leaving the passage free; but, as parties contemplate a rebuilding of both *dam* and *mill*, some attention should be given this point.

The first real obstruction is at Groton Paper Mill, and this is but slight. The dam is 7 feet from top of flush-board to apron, with a depth of 8 inches of running water. Below is deep water; and salmon will probably leap the dam.

Second obstruction, at Pepperell. This dam is 12 feet high; water falling on rocks below, with little depth. A fishway would be necessary at this point.

Between Pepperell and Nashua, one low dam, making a kind of reservoir for mills below. Salmon could probably leap this.

The main obstruction is located at Nashua,—a stone dam 15 or 20 feet high. A fishway will be necessary here.

The above are the only obstructions existing on the Nashua River, and, with the exception of the last, easily removed. I confidently look for salmon in the river at Lancaster soon.

Very truly yours, &c.,

J. L. S. THOMPSON, *for Fish Commissioners of Lancaster.*

Squawbetty Dam.

Plans and specifications of a fishway 12 feet wide and 2 feet deep were furnished to Mr. Charles Robinson, treasurer of the East Taunton Iron Works, to be built over the Squawbetty dam.

Mr. Robinson informs us that he has completed the work

according to directions. Should this fishway prove as successful as in other places where the same form has been built, the trouble and annoyance which has beset the company, through the energetic and persistent efforts of the Taunton fishermen for the last 30 years, will come suddenly to an end. It will be carefully looked after; and, should it prove what there is every reason to expect from it, some change may be necessary at Middleborough.

All the fishways, so far as is known, are answering the purpose for which they were built.

For reasons stated in last year's Report, no superintendent was appointed for the Holyoke fishway this year, and it is not known what passed over it. We did not feel justified in spending a single dollar on the Connecticut River so long as the State of Connecticut continued to maintain her present attitude. If some change is not made by her legislature, looking to a more just and equitable arrangement, the depletion of the river is but a question of time.

Lawrence.

As the fishway here surmounts a dam 28 feet high, and is, withal, one of the most difficult passes known, it has been thought best to keep a careful record of what has been seen passing over it.

Below will be found Mr. Holmes's report of two inspections each day.

REPORT OF FISH SEEN IN LAWRENCE FISHWAY, 1878.

- April 22. Fish first seen this year, a few suckers and silver eel.
- 23. A few suckers and chubs, one alewife.
 - 24. A few alewives, suckers, and chubs.
 - 25. A few alewives, suckers, and chubs.
 - 26. A few alewives, suckers, and chubs.
 - 27. A few suckers and chubs.
 - 28. A few chubs.
 - 29 to May 3. Freshet in the river; fishway two-thirds under water; did not draw it off.
- May
- 4. A few suckers, and two small silver eels.
 - 5. A few alewives, suckers, and lamper eels.
 - 6. A few alewives, suckers, chubs, and lamper eels.
 - 7. A few alewives, suckers, and lamper eels, one brook trout.
 - 8. A few lamper eels and suckers.
 - 9. A few suckers.
 - 10. A few alewives and suckers.

- May 11. A few alewives and suckers.
 12. One large black bass, a few alewives and suckers, 2 lamper eels, and 1 silver eel.
 13. A few alewives, suckers, and lamper eels, 1 silver eel.
 14. A few alewives, suckers, and chubs.
 15. A few alewives, suckers, and chubs.
 16. A few alewives, suckers, and chubs.
 17. A few suckers and chubs.
 18. A few suckers and chubs.
 19. A few suckers and chubs.
 20. A few alewives.
 21. A few alewives.
 22. Did not see any fish.
 23. A few alewives.
 24. A few alewives.
 25. 100 alewives, a few suckers, chubs, and lamper eels.
 26. A few alewives, chubs, and lamper eels.
 27. A few alewives, chubs, and suckers, 1 lamper eel.
 28. Alewives and suckers, run large; a few chubs and lamper eels, and 1 black bass.
 29. *One shad*, a few black bass, alewives, lamper eels, and suckers; run excessively large: never saw so many fish in fishway before.
 30. Alewives, lamper eels, and suckers, run excessively large; 1 *shad*, 1 trout, a few chubs, and red-fin shiners.
 31. Alewives, lamper eels, suckers, run excessively large; 1 *shad*, a few chubs, and black bass.
- June 1. Alewives, lamper eels, and suckers, run excessively large; a few chubs, black bass, and red-fin shiners.
 2. Lamper eels and alewives, run large; a few suckers, chubs, red-fin shiners, and small silver eels.
 3. Alewives and lamper eels, run large; a few red-fin shiners.
 4. Alewives, lamper eels, chubs, and suckers, run large.
 5. Alewives, lamper eels, chubs, and suckers, run large.
 6. Alewives, lamper eels, chubs, and suckers, run moderate.
 7. Alewives, lamper eels, chubs, and suckers, run moderate; a few black bass.
 8. Alewives, lamper eels, and suckers, run moderate.
 9. *Two salmon*, 8 to 12 lbs., a few alewives.
 10. *Four salmon*, 12 to 15 lbs.
 11. Alewives, lamper eels, chubs, and suckers, run small.
 12. *One large shad*, alewives, lamper eels, chubs, and suckers, run small.
 13. *One small shad*, alewives, lamper eels and suckers, run small; a few small silver eels.
 14. A few alewives, lamper eels, chubs, and suckers.
 15. A few alewives, lamper eels, chubs, suckers, and silver eels, 1 black bass.
 16. A few alewives, lamper eels, chubs, suckers, and silver eels.

- June 17. Two black bass, a few alewives, lamper eels, and silver eels.
 18. *One salmon, 18 lbs.*, a few alewives, suckers, and chubs.
 19. *One salmon, 12 lbs.*
 20. A few alewives, suckers, chubs, and small silver eels.
 21. Three black bass, a few alewives, suckers, chubs, and silver eels.
 22. A few alewives, suckers, and chubs.
 23. A few alewives, suckers, chubs, silver eels, and lamper eels.
 24. *Four salmon, 10 to 12 lbs.*, a few alewives, and silver eels.
 25. A few suckers, chubs, and small silver eels.
 26. A few suckers, chubs, and small silver eels.
 27. *One salmon, 12 lbs.*, a few suckers, and silver eels.
 28. *One salmon, 5 lbs.*, a few suckers, silver eels, and lamper eels.
 29. A few chubs, suckers, and small silver eels.
 30. Chubs, suckers, and small silver eels.
- July 1. One black bass, a few chubs, and silver eels.
 2. Small silver eels, run large; a few chubs.
 3. Silver eels, run heavy.
 4. Silver eels, run heavy, a few chubs, one alewife.
 5. Silver eels, run heavy, a few chubs.
 6. Silver eels, run heavy, a few chubs.
 7. Silver eels, run heavy, a few chubs. (Eels 1 in. to 1½ ft. long.)
 8. Silver eels, run heavy, a few chubs and suckers.
 9. Silver eels, run heavy, a few chubs.
 10. Silver eels, run heavy, a few chubs.
 11. Silver eels, run heavy, a few chubs.
 12. Silver eels, run heavy, a few chubs and suckers.
 13. Low water. Fishway closed.
 20. Let water into fishway. In P.M. found eels and hornpouts in it.
 21. Silver eels, run heavy, a few chubs and hornpouts. Fishway closed at 6 P.M., low water.
 25. Water let into fishway. In P.M. a few silver eels and suckers in it.
 26. Silver eels, run heavy, a few suckers and chubs.
 27. One black bass, silver eels, run heavy.
 28. Silver eels, run moderate, a few chubs, suckers, and roach.
 29. Silver eels, run moderate, a few suckers.
 30. Silver eels, run moderate, a few chubs.
 31. Silver eels, and a few chubs and suckers.
- Aug. 1. Silver eels, and a few suckers.
 2. Silver eels.
 3. Silver eels, a few chubs, and suckers.
 4. Silver eels, and a few chubs and suckers.
 5. Silver eels, and a few suckers.
 6. Silver eels, and a few suckers.
 7. Silver eels, and a few chubs and suckers.
 8. Silver eels, and a few suckers.
 9. *One salmon, 8 lbs.*, silver eels, and a few chubs and suckers.

- Aug. 10. Silver eels, chubs, and suckers.
11. One black bass, silver eels, and suckers.
12. *One salmon, 6 lbs.*, silver eels, and a few suckers and chubs.
13. *One salmon, 6 lbs.*, silver eels, and a few suckers.
14. Silver eels, and a few chubs and suckers.
15. Silver eels, and a few chubs and suckers.
16. Silver eels, and a few chubs, suckers, and shiners.
17. Four black bass, silver eels, a few chubs, suckers, and horn-pouts.
19. Silver eels, chubs, and suckers.
20. Silver eels, chubs, and suckers.
21. Two black bass, silver eels, and suckers.
22. One black bass, silver eels, and a few suckers.
23. Silver eels, and a few suckers.
24. Silver eels, and a few suckers.
25. Five black bass, silver eels, and a few suckers.

Nothing seen in the fishway from this time to Sept. 9, but a few suckers and small silver eels; water then shut out, as river was low; water let into fishway Oct. 17, and shut out again Oct. 20; no fish in the fishway at that time; water let in again Oct. 24; nothing seen in fishway but a few suckers up to Nov. 6, when water was shut out again.

ALEWIVES (*Alosa tyrannus*).

From the beginning of these Reports, we have persistently urged the importance of cultivating and increasing, to the fullest extent, these fish, not merely as a matter of food, but as having a direct influence in attracting inshore the larger and more valuable fish; pointing to the self-evident fact, that, where its food is, there will be found all animal life. We have pointed out the folly of selling or leasing, from year to year, the right to take alewives, to parties whose interests naturally lead them to catch all they can, thereby destroying the fisheries. We have also called attention to the fact that nearly all the streams, with a little care and additional expense, might be made to produce tenfold their present returns. It is gratifying to know, that, in many instances, these suggestions have been regarded; that new streams are constantly being stocked, and many of the older ones have been greatly improved.

Among the many valuable communications upon the subject which we have received, is one from Mr. Nathan Doane

of Harwich. In 1870 he called upon the Commissioners to lay out new fishways, and improve some of the old ones on Herring Brook. At the time of our visit we found him feeling a little blue. He had bought the right to take alewives from the stream for 10 years; had just finished his first year's catch, and found there were not fish enough to pay the rent. He had, to use his own expression, got the elephant; and the question was, what to do with him. We advised him to let all the spawning fish, as far as possible, go up to the pond, for at least 3 years. If he felt that his contract compelled him to take a part of them for the use of the town, they should be taken from the *last* run and not from the first. This would involve him, for the time, in a loss of some hundreds of dollars; but, as he had hired the stream for 10 years, it was his only way out of an ultimate loss of a still greater sum. There were pounds and weirs on the coast near the mouth of his brook. What effect they might have on his fishery, he was unable to say; but was of the opinion, that they were the cause of its present depletion, and might render any efforts to improve it useless. It required no little faith, and a considerable amount of confidence in the advice, to induce him to carry it out. For this he has been amply rewarded, the result having more than met his expectations. In a letter accompanying his returns,¹ he says, "Since I have had the brook, the fish have increased from 312 to 1,570 barrels; last year's catch being 745,750 fish."

We give these facts, that others may see what *has been* and *can be done*.

Fill the rivers and streams with alewives; crowd them to their fullest capacity, and, if more come than are wanted for use, give them free passage: their young will go down to the sea by countless millions, filling the bays and swarming along the coast, furnishing food, and thereby attracting into our waters the larger fish.

The returns from inland fisheries for this year show the total catch of alewives to be about 4,700,000. If to this were added the catch of persons who failed to make returns, the total would be greatly increased.

With this increase of alewives it is noticeable that there

¹ See appendix C.

has been a corresponding improvement in the bay and shore fisheries,—a suggestive fact which the United States, while paying out millions of dollars to the English government, would do well to consider. As a matter of economy, it might be well for them to co-operate with the States in opening and re-stocking all the rivers and streams leading to the sea, to their fullest extent, with migratory fish.

Such a movement would go far to restore our fisheries to what they were some sixty years ago, when there was no necessity of going out of our own waters to obtain all the fresh fish then required.

SHAD (*Alosa præstabilis*).

The returns received from the Connecticut and Merrimack show an increase in the catch of shad over last year.

We have in former reports so thoroughly pointed out the causes which led to the diminution of shad-fisheries in these rivers, that it is hardly necessary to repeat them here.

With the Connecticut, nothing can be done until a more equitable arrangement is made between the two States. With the Merrimack the case is quite different. The river lies wholly within New Hampshire and Massachusetts, and both are acting jointly and in perfect harmony. As the fish-ways have proved passable for shad as well as salmon, a vigorous effort will be made to stock the river and its tributaries with these fish, should the appropriation warrant it.

LAND-LOCKED SALMON (*Salmo sebago*).

From the works situated on Grand Lake Stream in Maine, under the care of Charles G. Atkins, we received, last season, two hundred and seventy thousand (270,000) eggs, from which were hatched two hundred and forty-five thousand (245,000) healthy young salmon.

These were distributed as follows :—

| | |
|--|--------|
| L. Tuck, for pond in South Weymouth . . . | 4,000 |
| N. C. Nicholson, for pond in Wellfleet . . . | 8,000 |
| S. H. Sylvester, for pond in Middleborough . . | 30,000 |
| W. F. Bigelow, for pond in Natick . . . | 4,000 |
| E. S. Merrill, for pond in Winchendon . . . | 8,000 |
| George L. Estey, for pond in Milton . . . | 7,000 |
| John Marlow, for pond in Lynn . . . | 3,000 |

| | |
|--|--------|
| A. W. Bisbee, for pond in North Rochester . . | 5,000 |
| J. D. W. French, for pond in North Andover . . | |
| James H. Curtis, for pond in West Scituate . . | 4,000 |
| Justin A. Wilson, for pond in Stoneham . . | 8,000 |
| A. Jewett, jun., for pond in Hubbardston . . | 5,000 |
| E. C. Howard, for pond in North Sandwich . . | 4,000 |
| Ohio Whitney, for pond in Ashburnham . . | 8,000 |
| Spencer Borden, for pond in Fall River . . | 5,000 |
| Charles F. Jenkins, for pond in Salem . . | 10,000 |
| H. C. Ewing, for pond in Holyoke . . | 7,000 |
| J. Dwight Francis, for pond in Pittsfield . . | 16,000 |
| Asa French, for pond in Braintree . . | 8,000 |
| Oscar Stowell, for pond in Wakefield . . | 6,000 |
| H. Newcomb, for pond in Greenwood . . | 8,000 |
| H. E. Priest, for pond in Waltham . . | 4,000 |
| F. C. Bacon, for pond in Lawrence . . | 8,000 |
| H. J. Dunham, for pond in Stockbridge . . | 20,000 |
| William H. Osborne, for pond in East Bridgewater . | 4,000 |
| D. G. L. Robinson, for pond in Wenham . . | 4,000 |
| Dr. Stone, for pond in Harvard . . | 4,000 |
| for pond in Winchester . . | 8,000 |

The remainder were turned into Halfway Pond in Plymouth. The returns received from many of those who had charge of these fish are very favorable. It is quite certain that they are well established in Halfway Pond. And in Mystic Pond, situated in Medford and Winchester, where they were first introduced, they are appearing in considerable numbers. On the 11th of September a land-locked salmon, 22½ inches long and weighing 3¼ pounds, was caught in Lower Mystic Pond by a boy while fishing for perch. The boy, not knowing what it was, sold it to J. P. Richardson of Medford, who forwarded it to the Commissioners for identification. A careful inspection of the pond made in October showed quite a large school of them, weighing from 2 to 8 pounds each, at the mouth of one of the streams entering the pond. The large fish are probably the Sebago salmon put in about 6 years ago. One of the persons making the inspection hooked one of them; but being in a small cloth canoe, barely large enough to carry one person, and having the fish on a light fly rod, he found it impossible to get him into the boat; and, in attempting to reach the shore, the salmon recovered himself, and with a sudden leap left hook, line, boat, and fisherman, behind him.

The successful introduction of this most valuable of all our fresh-water fish into the lakes and rivers of our State is of the greatest importance. Some of the distributions hitherto made are of doubtful character. Many of the ponds are not suitable for the fish; and the Commissioners labor under the difficulty of not being able, in all cases, to determine the question by personal inspection. Again, the number of young salmon put into some of the ponds is too small, unless continued for several years, to produce any decided results.

The attention of applicants is called to the following regulations: —

All parties ordering land-locked salmon must make application in writing, giving a careful description of the pond in which they desire to place them.

The plan is to furnish them at the State hatching-house in Winchester, free of charge, to all applicants having under their control any of the great ponds of the State. For transportation, parties should bring with them good clean half-barrels or milk-cans, holding 10 or 12 gallons, a thermometer, and a dipper for aërating the water. The half-barrels will carry from 4,000 to 5,000, and the milk-cans about 3,000.

The introduction of these fish into ponds having neither inlet nor outlet for them to run into is an experiment, the result of which time alone can settle. That trout will breed in such ponds, and that these salmon spawn on the shoals of Sebago Lake, is well known.

There will probably be about 200,000 of them to be distributed next May. No order will be received after the 20th of April.

CALIFORNIA SALMON (*Salmo quinnat*).

Two hundred thousand spawn of these fish were received last year from the United States Commissioner, — 100,000 at Winchester, and the same number at the hatching-house at Plymouth, N.H., under the joint care of the two States. These hatched with a loss of about 10 per cent.

The following distribution was made in December from the Winchester hatching-house: —

| | | | | | | | |
|-------------------------|---|---|---|---|---|---|--------|
| Ipswich River | . | . | . | . | . | . | 7,000 |
| Nashua River | . | . | . | . | . | . | 30,000 |
| North River | . | . | . | . | . | . | 25,000 |
| Saugus River | . | . | . | . | . | . | 7,000 |
| Bridgewater | . | . | . | . | . | . | 10,000 |
| Head-waters of Merrimac | . | . | . | . | . | . | 10,000 |

Those hatched at Plymouth were all turned into the Pemigewasset and its tributaries about the 1st of January. These fish certainly survived the winter, and were seen in considerable numbers up to the last of July, when they disappeared.

Mr. Livingston Stone states, in his report published by the United States Commission, that these fish spawn but once, and then die. This statement, if true, not only lessened the value of this fish, now being so widely distributed, but was so at variance with all known habits of kindred species, that we ventured to criticise it in our last Report, in the hopes of calling out further information. Several communications have been received from gentlemen in California, familiar with the habits of these salmon, all adverse to the statement, or what one of the writers humorously calls Mr. Stone's dying theory. But the following letter from one of the able California commissioners more fully covers the ground, and appears to settle the question beyond dispute.

SPAWNING OF CALIFORNIA SALMON.

SAN FRANCISCO, CAL., March 13, 1878.

PROFESSOR SPENCER F. BAIRD, *Washington, D.C.*

Dear Sir,—In reading that portion of the Massachusetts Report for 1878 which relates to California salmon, some questions are asked, and doubts expressed, on subjects which are to me quite clear. I thought it advisable to answer some of these questions to you, if you are not already informed in relation to them.

First, The impassable barrier of which the Report speaks, across the McCloud River, is only a temporary affair, and is only placed across the river after the great body of spawning salmon have gone to the head-waters, and is only used during the necessary time of taking fish in the pool below for spawning purposes.

Secondly, In relation to Mr. Stone's theory that all the McCloud River salmon die after having spawned: both the senate and assembly committees of the legislature have been taking testimony of all the leading fishermen on the Sacramento River. Probably more than 50 fishermen have given testimony, especially on two points: first, "Where does the spring run spawn?" and, secondly, "Do you catch any fish on their return from the spawning-grounds, and what proportions?" On the

first question they expressed entire ignorance, except that in the San Joaquin River in the spring large numbers of salmon are ripe or nearly ripe : they are also ripe at this season in the short coast rivers. The concurrent testimony of the fishermen was, that in October and November, in the Sacramento River they caught from 5 to 15 per cent of fish that had spawned. Many of these were taken on the "back of nets," drifting toward the ocean with their heads up the stream. This testimony was given by fishermen who had fished at Vallejo in salt water, at Rio Vista and Collinsville in brackish water, and so on up to Sacramento in entire fresh water. They all concurred that about 10 per cent of the catch in October and November was of fish on the return from their spawning grounds ; they do not draw their seines for these fish, as they will not sell, and are considered of no value. They say that these fish are black, hooked-mouthed, and have dog's teeth. Some are caught on the right side of the net, but a majority drift into the net on the upper side. They said that they saw them in large numbers at this season of the year ; and they were usually with head up stream, with only sufficient motion to their fins to keep them balanced, and floating to the sea with the current. I know of my own knowledge that some of the McCloud River salmon remain in the river until the next year. On the 5th of July last I was fishing on the head-waters of the McCloud River, about fifty miles above the United States fishery, catching salmon and trout. The salmon that season had just arrived, and would take the hook, but in the pools there were also numerous salmon of the previous year — hook-mouth and dog-teeth — which could not be tempted to take any thing. Sir John Reed, who was fishing in the same pool with me, improvised a long gaff with which he caught one of these fish of the previous year. Although thin, it weighed 22 pounds. We saw several others, but did not attempt to take them. These fish certainly must have remained in the water 6 or 8 months without food, and for some unaccountable reason failed to return to the ocean. It is certainly true that large numbers do die and get injured, but from the testimony of the fishermen I am satisfied that large numbers return to the ocean each year. The opinion of the fishermen is that they return to the ocean after spawning, with the first rains on the head-waters. The coast-rivers salmon spawn in January and February, in the short streams that empty into the ocean, and immediately return after spawning. Most of our coast rivers have bars at their mouths, thrown up by the waves ; and, when these rivers and streams are low, fresh water passes through these sandbars to the ocean. When the floods come in the winter, they tear open a passage through these bars. The salmon immediately enter, and work up into all the small branches in the hills where it is possible for them to reach, spawn in a few days, and immediately return down stream into the ocean. It was but last Saturday I took 7 of these salmon in pools in a small stream which ran through a pasture within twenty miles of San Francisco. This stream empties into the bay. Our winter rains have been more heavy than usual, and all these short coast and bay streams are full of salmon spawning.

Now, as regards young fish, I have repeatedly taken young salmon, one year old, with a fly, at the U. S. fishery in July and August. These

young fish were always in the centre of the river, while trout would be taken in shoaler water near the shore. I am therefore certain that some of them remain in the river for one year after they are hatched. Many grilse are taken in the bay here from the wharves, weighing from $\frac{3}{4}$ of a pound to 5 or 6 pounds. I have never seen any taken in salt water which I thought was younger than 2 or 3 years. I am certain that Mr. Stone is in error in reporting that California salmon die after having spawned.

The joint committee of the senate and assembly have agreed to report a bill for the close season, from Aug. 1 to Sept. 15, and also from Saturday noon until Sunday noon of every week throughout the year. We have urged, that, in addition to every Sunday, the close season should be from Aug. 1 to Oct. 1. This concession has been made to the fishermen, who ask, that, in consideration of giving them the additional two weeks, the penalties might be increased to \$25 for each salmon found in possession during the close season, and \$250 penalty and confiscation of any net found in the water during the close season. They also promise that they themselves, in their own neighborhoods, will see that this law is faithfully observed. In their testimony they admit the benefits derived from the artificial hatching of salmon, and urge upon the legislature to increase the appropriation for this purpose, but did not seem willing that the close season should be longer than one month and every Sunday. So this bill, as reported, is a compromise as between what we ask, and what the fishermen want.

Shad are becoming quite numerous, and there are one or two every day in the market, which sell for from 5 to 8 dollars apiece. They are generally caught in the bay by fishermen fishing for herrings.

B. B. REDDING.

472,500 California salmon spawn were received last October: 367,500 at Plymouth, N.H., and 105,000 at Winchester.

These are all hatched with a loss less than 10 per cent, and will shortly be distributed.

SALMON IN THE MERRIMACK.

The run of salmon in this river last year was mainly from the planting of 1873. No young salmon were put into the Merrimac in 1874, and no decided run was expected in 1878. It should be remembered that they spawn only every other year, and that they return in four years from the time they are hatched. This would, for 1878, give us an off year.

But few were seen at the Lawrence fishway, and only 11 taken at the works at Plymouth, — 8 males and 3 females. Doubtless more would have been taken, had it not been for the unfortunate delay in building the new fishway at Man-

chester, which kept the fish back until the fall rains had so swollen the river that it was almost impossible to use the nets, or prevent the fish going above. A more substantial arrangement will be completed next spring for catching the fish, when there is every reason to look for a good run of salmon, as those that went up last year, and the planting of 1875, may be expected to return the coming season.

Our experience with young salmon in this river shows pretty conclusively that they do not go down to the sea until the third year. The salmon put in the river in 1876 have been carefully watched, and were found to be very numerous all along the river, especially near the mouths of trout-brooks, showing no disposition to change their quarters until about the middle of last August, when they began slowly to move down stream. None were found after the 1st of September above Livermore Falls, and by Nov. 1 only a few stragglers were found near the hatching-house. It is therefore probable that they left the river during the rise occasioned by the fall rains, and not on the spring freshets as has been heretofore supposed.

The hatching-house and ponds at Livermore Falls are being constructed by the joint action of the States of New Hampshire and Massachusetts, and are nearly completed.

The work has been carried on under the superintendence of A. H. Powers, one of the New Hampshire commissioners, who makes the following report:—

PLYMOUTH, N.H., Nov. 15, 1878.

E. A. BRACKETT, *Commissioner on Fisheries.*

Dear Sir,—I took charge of the hatching-house and grounds at Livermore Falls on the 28th of March; but owing to the frost was unable to do much until about the middle of April, when I commenced to increase the depth and area of the reception ponds.

This was continued until the middle of June, when we stopped, preparatory to taking what few salmon might be expected up the river. It was considered important that the character of the water in the pond should be thoroughly tested this year. As you are aware, it has proved perfectly successful. The salmon were very healthy all through the season, and when turned out in November were in good condition, probably better than those which remained in the river. Some that were somewhat injured in taking them, and upon which fungus appeared, soon cleansed themselves of it, and became bright as they were when first caught.

Some further excavating of the pond may be required next spring, when, I trust, the pond will be sufficiently large and deep to sustain all the fish we may take for some years to come. A portion of the banks has been graded and grassed, but not enough yet to prevent the water being roiled by heavy showers, which makes it difficult to watch the fish during spawning time. This can be improved in the spring; and, by filling in gravel near the mouth of the flow-pipe, would probably attract the fish to this point, where the water is clear.

We have enclosed the works by a picket-fence 6 feet high and 1,000 feet long. Inside of this has been constructed a small tool and guard house.

The tanks have been completed, and are now tight; have a capacity for 600,000 salmon-eggs, and, with a little expense, could be made to carry double that number. Owing to the sudden rise of water which takes place with almost every summer shower, it is necessary that some change should be made in our arrangements for taking fish.

On the 8th of October last I received from Professor Baird, United States Commissioner, 367,500 California salmon-eggs, shipped from McCloud River, Cal., which are nearly all hatched, with a loss of not more than 10 per cent, including all losses from time of shipment to date.

Owing to the delay in building the Manchester fishway, the heavy rise in the river after it was completed, and the non-planting of young salmon in 1874, I have not been very successful in taking salmon. The first was taken the 22d of June, and the last Oct. 23, — 11 in all, weighing from $7\frac{1}{2}$ to 15 pounds, — 8 males and 3 females. Ten were taken in the night, between the hours of 8 P.M. and 6 A.M., and 1 on the 20th of October, about midday.

The California salmon-fry turned into the river in 1878 were very numerous up to the last of July, and had grown to the length of about 3 inches. On the 20th of June they were so plenty as to be seen in numbers in any locality near the hatching-house.

Atlantic salmon, 7 inches long, of the planting of 1876, were so plentiful up to about the middle of August, that it was impossible to fish without frequently hooking them. Mr. R. R. Holmes actually hooked 3 at one cast, and remarked that the river was alive with them. In August they began to disappear, and at this date very few are seen. On the 6th of November I dipped up a small Atlantic salmon, about 3 inches long, at the outlet of the hatching-house brook, which must have resulted from last year's run of salmon in this river, as there has been no plant since 1876, which, as before stated, have grown to the length of 7 inches.

With the exception of the improvements suggested above, — all of which can be completed next spring before the fish come up, — I see no reason why the works should not be in complete working order.

Yours truly,

A. H. POWERS, *Superintendent.*

CONNECTICUT RIVER.

The extraordinarily bad season of 1877 in the Connecticut River brought the diminution of shad to such painful notice, that our Legislature passed resolves calling the attention of Connecticut to the fact. By invitation of the Committee on Fisheries of the Connecticut Assembly, the Massachusetts Commissioners on Inland Fisheries appeared on the 26th of February, 1878, and made the following statement:—

Mr. Chairman and Gentlemen of the Committee on Fisheries.

We come before you, on your invitation, not as advocates or as witnesses, but as State officers, to make such statements and explanations as may be called for by the recent resolves of the Legislature of Massachusetts touching the exhaustion of the shad-fisheries in the Connecticut River; and we propose very briefly to consider each paragraph in this document. The preamble begins:—

“ *Whereas*, The Connecticut River formerly abounded in shad and salmon, which had much diminished, however, in recent times, by reason of excessive fishing and impassable dams.”

The truth of this statement is so generally acknowledged that it need not delay us. At the close of the last century salmon and shad were still very abundant in the Connecticut, and the former were often sold at 50 cents each. The salmon penetrated to the head-waters, and spawned in Israel's River and the Upper and Lower Ammonoosucks. The shad penetrated only to Bellows Falls, which they could not surmount. They passed Turner's Falls, however, in great numbers; and as many as 5,000 in a day have been taken with dip-nets from a single rock at this point. In 1798 a high dam erected just below the mouth of Miller's River shut the salmon from their spawning-grounds, and practically exterminated them within a dozen years. The shad, breeding in all the lower waters, continued in plenty until 1849, when the erection of an impassable dam at Hadley Falls seriously curtailed their numbers. This will be treated more fully under another head. The preamble continues:—

“ *Whereas*, The State of Massachusetts, as well in a spirit of comity for neighboring States as for the benefit of her own citizens, has appointed Commissioners on Inland Fisheries, and has expended large sums of money in building fishways, in hatching shad, and in seeding the river with great numbers of young salmon, whereby shad were at one time restored to their ancient abundance, and whereby there is now a good hope of restoring salmon to the river.”

The origin of our Commissioners on Inland Fisheries did not spring from a desire to increase our own wealth, but entirely from a wish to render justice to our sister States, Vermont and New Hampshire; the latter of which passed in 1864 a resolve which recited that, “ *whereas* the rivers

and lakes of this State were wont formerly to furnish an inexhaustible supply of salmon, shad, and other migratory fish, which have now entirely disappeared from our waters; and whereas there is nothing to prevent the return of such fish but the want of suitable fishways over the dams across the Connecticut, Merrimack, and Saco, and other rivers, and in such numbers as to contribute very largely to the supply of wholesome and agreeable food for the inhabitants of this State: therefore, resolved, that the attention of the States of Massachusetts, Connecticut, and Maine be invited to this subject, and that they be earnestly requested to take early measures to cause such fishways to be constructed . . . as due alike to the relations of comity between those States and our own, to the obligations of national law, and to the interest of those States themselves."

In March, 1865, a joint committee of the Massachusetts Legislature held a hearing for the parties in interest; and, on their recommendation, two commissioners were appointed the following summer, to investigate and report on the subject. At the following session, the Legislature established the commissioners for 5 years, and made an appropriation of \$7,000; in 1867 the appropriation was \$10,000; and annual appropriations have been since continued, never of less than \$2,500, and usually of \$5,000. During the 12 years of their service, the commissioners have steadily borne in mind the original object of their appointment, and have striven to free the Merrimack and Connecticut from obstruction. Although the legislative committee and two successive attorneys-general opined that the Holyoke Water Power Company was exempt from putting a fishway in their dam, the commissioners held a different view, and sued the company in the name of the State. The case was tried by the Supreme Court, and appealed to that of the United States, where the decree was affirmed; and the company was compelled to build a fishway on the most approved model, and at a cost of about \$30,000. As early as 1867 Seth Green was employed by the commissioners to attempt the artificial hatching of shad at Hadley Falls. He was entirely successful; and the operation has been since continued by Massachusetts, or Connecticut, or by the United States. Of the effects of this artificial propagation we do not propose to speak dogmatically, but to give some facts and reasons that may perhaps indicate those effects. The closing of the Holyoke or Hadley Falls dam in 1849 was, for reasons which will be considered farther on, a severe injury to the shad-fisheries; indeed, the injury to fisheries *below* the dam was a point which had escaped lawyers, and was one of the main grounds of the decision which compelled the company to build a fishway. The statistics of Parsonage Pier in Connecticut fishery show this very distinctly. The average catch there for the 10 years from 1827 to 1836 was 10,376; for the next 10 years, 9,332, showing a slight decline, attributable perhaps to increase of population and fishing. For the 5 years after the closing of the Holyoke dam, 1849-53, the average rose suddenly to 19,490. For the next 10 years, 1854-63, it as suddenly fell to 8,364; and for the following 6 years, 1864-69, it further decreased to 4,482, less than one-half its first yield. The closing of Holyoke dam shut back all the shad that had frequented the *upper* spawning-beds; and they retreated in confusion

down the river, and were taken in plenty. Alewives have conducted themselves in the same way in other streams. It takes 3 years for a shad to attain the merchantable size, and about 5 years for its maximum growth. When the dam was closed, there were in the river the *full-grown* fish (some of which had bred in the upper ground), and there were 4 successive crops of *younger* fish, the last of which would not get their full growth for 4 years. The unusual abundance would last so long as the column was annually recruited by the younger generations, which would be for 5 seasons. After that the crop of the lower stream would sink to that of the spawning-beds, which still were accessible.

Returns from another pier fishery for a less number of years (1851-68) give substantially the same results. In 1851 the catch was 15,942; the average of the next 9 years was 6,765; and, of the last 8 years, only 5,448. On the whole, then, there was a decrease, and a *continuous* decrease, from the closing of the Holyoke dam—and perhaps before that date—to the year 1868. That season was unusually poor for shad-fishing all along the coast of the Northern and Middle States; but, in apparent contradiction, the Connecticut River teemed at all points with little yearling shad. Next season (1869) larger fish, of two years old, were in great plenty. On Sunday, May 21, 1870, vessels in Long Island Sound observed vast shoals of shad. The next day they struck in, at and about the mouth of the river, and filled the nets. The total yield of the pounds that day was reported over 25,000. At Haddam Island, in the river, 700 were taken at one sweep of the seine, which was more than one-third the yield of a similar seine for the whole of the previous season. The Hudson on the west, and the Merrimack on the east, showed no unusual catch; indeed, the phenomenon was a local one, confined to the Connecticut. The whole effect may not be due to Green's propagation in 1867, because in 1868 Connecticut forbade any mesh smaller than 5 inches, whereas a $2\frac{1}{2}$ -inch mesh had before been used; and, furthermore, a "close time" of 36 hours a week was ordered. The result was, that the yearlings and two-year-olds escaped through the meshes, and swelled the catch of large fish in the following years. Nevertheless a part of the increase may reasonably be laid to the artificial propagation, whose tendency seems to be to counteract the natural *decrease* in our fisheries, even if it does not cause an *increase*. The following statistics of the best fishery within the Massachusetts line may illustrate the point.

Hadley Falls Shad Fishery Statistics — 1868-1877.

| YEARS | 1868. | 1869. | 1870. |
|-------------------------------------|--------|---------|--------|
| Gross catch for each year . . . | 7,341 | 8,807 | 11,618 |
| Date of taking first shad . . . | May 6. | May 13. | May 6. |
| Number of 'days in fishing-season . | 40 | 33 | 40 |
| Average number of fish a day . . | 183 | 267 | 290 |

Hadley Falls Shad Fishery, &c. — Concluded.

| 1871. | 1872. | 1873. | 1874. | 1875. | 1876. | 1877. |
|--------|---------|---------|---------|---------|---------|---------|
| 10,634 | 7,691 | 7,294 | 15,057 | 9,135 | 10,741 | 2,674 |
| May 1. | May 11. | May 14. | May 13. | May 18. | May 22. | May 14. |
| 44 | 45 | 35 | 37 | 38 | 33 | 42 |
| 241 | 170 | 208 | 407 | 240 | 325 | 63 |

| | |
|---|--------|
| Total catch for 10 years, 1868-77 | 90,992 |
| Yearly average for the 10 years | 9,099 |
| Yearly average for first 5 years | 9,220 |
| Yearly average for second 5 years | 8,980 |
| Daily average for 10 years | 239 |
| Daily average for first 5 years | 230 |
| Daily average for second 5 years | 248 |

Previous to this period, and posterior to the closing of the Holyoke dam, the catch had been much larger. In 1865 it was estimated at 35,000, and in 1853 at 45,000.

Hence we draw the conclusion that a cause has been at work to keep up the fishery at this point, because, with the exception of the last season, it has maintained a pretty uniform average for 10 years since 1868, before which time it had much decreased; and such cause we find in artificial propagation conducted on this very fishing-ground, whose fish would return, as is well known, to the spot on which they were bred. In 1874, 800,000 young salmon were put in the Connecticut River, of which 271,000 were contributed by Massachusetts. If such success crowns this as that of the Merrimack, next spring (1878), will see a large number of salmon, weighing from 10 to 15 pounds, endeavoring to force the mouth of the river, and mount to their spawning-grounds once more, after an interval of nearly a century. They will meet no impediments north of the Massachusetts line. The dams at Holyoke and at Turner's Falls are furnished with the same fishway that last season carried every salmon over the great Lawrence dam. It is for Connecticut to consider whether her laws and her modes of fishing are such as to allow fair passage to this valuable fish. There is no reason why the river should not furnish annually 100,000 pounds of salmon, without lessening the other fisheries.

The preamble continues: —

“ *Whereas*, The State of Connecticut has, in like manner and for similar purposes, expended money, and appointed commissioners who have diligently performed their duties, and have made wise plans, in agreement with their fellow-commissioners of Massachusetts, for increasing and maintaining the river fishes.”

The appointment of fishery commissioners in Connecticut was nearly contemporaneous with that in Massachusetts. Of the Connecticut commissioners, 2 have been in service about 9 years, and the third 7 years; a good indication of their acceptable conduct. Of the Massachusetts commissioners, one has served since the first appointment in 1865, one 9 years, and the third 5 years. Eleven years ago, in 1867, the commissioners of the New England States arranged informal meetings for consultation from time to time. In that entire period there has been no important difference of opinion among them as to the methods best to be pursued, or the laws to be enacted. The commissioners from Connecticut and Massachusetts were often, from their position, the most nearly connected. It was by their agreement that Connecticut passed the *conditional* Act of 1867 (chap. 106, May session), by which a "close time" for pounds and nets was ordered, from Saturday night to Monday morning of each week; and the mesh of weirs was put at 5 inches. This Act being conditional on the passage of a similar one by Massachusetts, that State passed the necessary law at the next session of its Legislature; and it is safe to say, that had it remained on the statute-books, and been honestly enforced from that day to this, the river would have abounded in shad, and the fishermen would have been much better off than now they are. It has already been stated that the shad-hatching at Holyoke, and the introduction of salmon-fry in the upper Connecticut, have been undertaken by both States, acting under agreement.

The preamble finishes thus:—

"Whereas, Certain persons in the State of Connecticut have fished and still continue to fish in improper ways and at improper times, in opposition to the advice of the commissioners of said State, and in violation of agreements with them made, so that only a few shad escape, and arrive at their spawning-beds, of which the greater part are in the State of Massachusetts; and so that the fisheries in Massachusetts are no longer profitable, and so that the number of spawning shad which escape is not enough to keep up the supply in the river."

It is not easy to agree what is an "improper way and improper time" of taking fish; although we may say in general that any way or time is improper that does not leave enough to renew the crop. The difficulty of decision was well exhibited at the hearing at Hartford in 1867, at which the Massachusetts commissioners were present by invitation. There was a great mass of testimony from fishermen. The pond-owners averred that sweep-seining was very destructive to shad, but that pounds actually increased them, by capturing many sharks and other predatory animals. The gill-netters said the pounds destroyed all the young fish, but that gill-nets could only be used a small part of the time, and did much good by catching spawn-eating eels. Finally, the sweep-seiners said their nets only made a sweep or two, and then left the channel free, while the gill-nets constantly vexed the stream, and killed more fish than they caught. Not even on such a question as the *direction* of the *run* of shad, could these men, some of whom had fished for seventy years, be brought to agree; for, whereas many were sure the shad came from the direction of Montauk Point, and consequently were taken only on the

east sides of the pound, others were equally sure that they came through Hell-Gate, or, at any rate, from the westward, and were taken on the west sides.

With the desire of getting reliable information, the commissioners of Connecticut and Massachusetts visited the pounds set in the Sound, west of the river's mouth, on May 20, 1868, and May 25, 1869. On the first occasion, 26 pounds were found between Saybrook Light and Mononessuc Point, a distance of about 10 miles. Some of these extended about a mile into the Sound, and were furnished with 2 bowls, 1 at the end, and the other midway. The pound selected for a test was, in each case, set with a $2\frac{1}{2}$ -inch mesh; but the results were quite different. The Westbrook pound of 1869 contained some 6,000 or 7,000 fishes in all, among which were a considerable number of large shad, but few small shad, with a mass of menhaden and alewives, and a few sea-herring, tautog, weak fish, rays, &c. The Saybrook pound of 1868 was estimated to contain some 20 barrels of fishes. Of these, about 70 were marketable shad; some 1,500 were young shad, fit only to be packed as herring, or sold for manure; and the rest were miscellaneous fishes, as before, but without menhaden. In neither case were there any sharks. The 2 drawings, on different years and in different places, but at the same season, showed that the pounds sometimes took large quantities of young shad, and sometimes few or none. Had they *always* taken young shad in the proportion observed in 1868, it was estimated that these pounds would, in one season, have destroyed 3,822,000 immature shad. But the second experiment served to show that the destruction, though probably considerable, was much below these figures. Furthermore, the careful experiments conducted with a Massachusetts pound in 1871 proved that if properly placed, set with a proper mesh, and closed during a certain time each week, a pound may be an unobjectionable mode of fishing. Indeed, Mr. Milner, a man of great experience, approves it, under certain circumstances, but insists on a "close time" of $2\frac{1}{2}$ days each week. It is scarcely necessary for us to bring proofs that certain persons in this State fish in a way not approved by its commissioners, who have always been in favor of limitations on pounds, whose owners, on the contrary, desire to fish the whole season, and with such mesh as they like. We wish to touch as lightly as possible on the topic of violations of agreement between the commissioners of this State and certain fishermen; and we will therefore simply draw attention to the following reports: 1867, pp. 4, 5, and 25; 1870, p. 6; 1871, p. 30; 1874, *passim*. In 1871, on p. 30 they state, in set terms, that certain poundmen were dishonest, did not observe close time, and violated their voluntary agreements. These are the deliberate statements of State officers in the discharge of their trust.

Without entering into the question of what kind of fishing is injuring the shad supply, it seems certain that the sudden increase in 1870 was temporary, although for several seasons thereafter the catch showed its beneficial influence. Still for the last three seasons, and especially for the last two, complaints of marked decrease have come from most points on the river. But the past season (1877) has been so disastrous as to attract universal attention. According to an excellent authority, Mr. O.

H. Kirtland, the pounds, seines, and gill-nets near the river's mouth took only from one-half to one-fourth their average catch; while the 9 Massachusetts seines yielded from one-third to one-fifth their average, and their gross catch was less than the average of the Hadley Falls seine, and less than that of the Taunton River. These facts go far to prove that not enough shad escape to keep up the race, despite the artificial propagation. That their chief spawning-beds are in fresh water, and within Massachusetts, seems demonstrated: 1st, by the testimony of observers; 2d, by the fact that when, in 1849, the upper spawning-beds were cut off, a great reduction in numbers took place; 3d, by the want of proper testimony to show that shad breed in salt water. On this point Professor Baird and Mr. Milner, who are high authorities, write us, under date Feb. 11, 1878, that they "do not think there is any foundation whatever as to the impression in regard to the spawning of shad in salt water. All our investigations on the Southern coast have failed to reveal spawning fish in other than fresh or perhaps very slightly brackish water."

The Resolves then follow: —

"*Resolved*, By the Senate and House of Representatives in General Court assembled, —

"1. That the attention of the State of Connecticut be invited to this subject, and that she be earnestly requested to take such action in the premises as may be due to the relations of comity between sister States, and to the interests of both.

"2. That his Excellency the Governor be requested to transmit a copy of these Resolves to his Excellency the Governor of the State of Connecticut, with the request that the same may be communicated to the general assembly of that State, now in session."

Mr. Chairman and Gentlemen of the Committee, our duty ends here. It would obviously be improper for us to attempt to dictate the legislation of a sovereign State.

The Commissioners had been told that a majority of the committee were, in one way or another, interested in pounds at the river's mouth; and their conduct went far to corroborate the statement. The chairman might readily have been taken for an advocate who appeared in behalf of the poundmen; and there was, in addition, a hired attorney, who seemed to mistake the officers of a sister State for witnesses who were to be diligently cross-examined. It was obvious, from the outset, that their errand was a vain one, that no judicial proceedings could be expected, and that nothing more could be done than to lay a foundation for work at a more propitious moment.

Especial marks of incredulity were shown, when, in the statement of the Massachusetts Commissioners, the return of

the salmon to the river was predicted for the following spring. But, in the month of May, the incredulity of the Connecticut fishermen was broken down, only to be replaced by rapacity. The adult salmon, product of the plant of 1874, did indeed enter the river's mouth, heading for its upper waters. Instantly they were set upon; and, so far as can be learned, about 500 fine fish, weighing from 8 to 20 pounds each, were in the course of the season taken, and sold in the markets. Thus did 4 years of expectation end in disappointment; and thus was great expenditure of money, labor, and skill, thrown away. In marked contrast to this conduct was the strict enforcement of law in Massachusetts. A few straggling salmon succeeded in getting to the Holyoke dam, where one of them was speared. But even this single offence was not allowed to pass; and a warrant was immediately issued for the arrest of the offender. Indeed, in the matter of State comity, so far as fisheries are concerned, our Commonwealth may properly claim to have acted in good faith from the outset. When, in 1864, the Legislature of New Hampshire called on Massachusetts to take measures for the restoration of migratory fishes to the Merrimack and Connecticut, our Legislature took immediate and earnest action; and the large sums of money since spent by the Commonwealth for this object are a proof of honest endeavor. We cannot doubt that the people of Connecticut, once roused to a sense of the situation, will see to it that wise fishery-laws are passed and enforced.

In conclusion it may be said, the wealth of a nation consists mainly in its agricultural, manufacturing, and fishing interests. The first two departments have always received that attention which they justly demand. To bring them to their present state of perfection, has been the work of centuries, requiring the greatest energy and the fullest exercise of genius; while the last, under the mistaken idea that it did not come within the range of culture, has been left on the verge of civilization. Beyond the inadequate efforts to check the destructive inroads which man, still linked to his barbarous nature, is ever prone to make upon the lower forms of life, nothing had been done until within a few years. Every thing had been left to the unaided and uncertain development of Nature, who, however tireless in pushing

countless millions into being, is still more remarkable in her shortcomings. For every success there are a thousand failures; like trees crowded together in a great forest, the strong are ever overshadowing and absorbing the weak.

It is a survival not of the fittest, but of the most favored. Upon our ability to create suitable conditions, to subordinate the lower to the higher forms of life, depends the success of all cultivation. Recent discoveries and inventions have made fish-culture as certain as any other industry. Starting from a small beginning, it has spread over the civilized world, and in many countries has already become an important element in political economy. While the inland fisheries, as compared with those of the deep sea, are limited, yet the yearly returns of \$2,000,000 from the salmon fisheries of Ireland, and \$85,000 for rental of one small river in Scotland, show that, in proportion to the capital and labor employed, they are more remunerative. We may not *directly* increase the sea-fisheries: the artificial hatching of cod and haddock would probably make no perceptible difference in their numbers, nor does there appear to be any need of it. Nature has made them not only wonderfully prolific, but has taught them to deposit their spawn under conditions hardly within our reach. Fortunately the rivers and streams, which are the arteries of the ocean, ever bearing to her bosom the necessary conditions of life, are largely under our control. The ease and certainty with which we can multiply the migratory fish that enter these waters open the only available avenue to the restoration of the in-shore fisheries.

A great deal has been said during the last year, of the lack of employment, and its consequent effect upon a portion of our people. Whatever of truth or error these statements may have contained, it is evident that the increasing population demands that every resource within our means should be carefully and thoroughly developed.

THEODORE LYMAN,
E. A. BRACKETT,
ASA FRENCH,

Commissioners on Inland Fisheries.

EXPENDITURES OF COMMISSION.

| | | |
|---|------------|------------|
| Salary | \$1,650 00 | |
| Travelling and other expenses | 233 75 | |
| | <hr/> | \$1,883 75 |

GENERAL EXPENSES.

| | |
|--|----------|
| Subscription to Schoodic salmon-breeding enter- prise | \$500 00 |
| R. R. Holmes, services and expenses | 104 35 |
| Expenses on salmon-eggs from California to Chicago | 168 23 |
| Linen hose and couplings | 95 00 |
| Nets and twine | 80 60 |
| Expressage | 56 05 |
| Printing | 50 96 |
| Rent of land for fish-house | 50 00 |
| Plans, specifications, &c. | 41 10 |
| Fish-cans, chains, &c. | 42 53 |
| Labor, State hatching-house | 19 50 |
| Advertising | 6 75 |
| Serving notices | 7 50 |

IMPROVEMENT OF HATCHING-HOUSE AND
FISHWAY.

| | | |
|--|--------|------------|
| Labor, &c., on Plymouth hatching-house | 721 15 | |
| Labors, &c., on Lawrence fishway | 72 60 | |
| | <hr/> | 2,016 32 |
| | | <hr/> |
| | | \$3,900 07 |

APPENDIX.

[A.]

COMMISSIONERS ON FISHERIES.

UNITED STATES.

| | |
|----------------------------------|--|
| Professor SPENCER F. BAIRD . . . | { Smithsonian Institution, Washington, D.C. |
|----------------------------------|--|

MAINE.

| | |
|----------------------------|-----------|
| E. M. STILWELL | Bangor. |
| HENRY O. STANLEY | Dixfield. |

NEW HAMPSHIRE.

| | |
|-------------------------|-------------|
| LUTHER HAYES | Milton. |
| SAMUEL WEBBER | Manchester. |
| ALBINA POWERS | Grantham. |

VERMONT.

| | |
|---------------------------|----------|
| M. GOLDSMITH | Rutland. |
| CHARLES BARRETT | Grafton. |

MASSACHUSETTS.

| | |
|--------------------------|------------------|
| THEODORE LYMAN | Brookline. |
| E. A. BRACKETT | Winchester. |
| ASA FRENCH | South Braintree. |

CONNECTICUT.

| | |
|-----------------------------|-------------|
| WILLIAM M. HUDSON | Hartford. |
| ROBERT G. PIKE | Middletown. |
| JAMES A. BILL | Lyme. |

RHODE ISLAND.

| | |
|------------------------------|-------------|
| NEWTON DEXTER | Providence. |
| ALFRED A. REED, Jun. | Providence. |
| JOHN H. BARDEN | Scituate. |

NEW YORK.

| | |
|-------------------------------|----------------|
| HORATIO SEYMOUR | Utica. |
| ROBERT R. ROOSEVELT | New York City. |
| EDWARD M. SMITH | Rochester. |

NEW JERSEY.

| | | | | | | |
|----------------|---|---|---|---|---|-----------|
| J. R. SHOTWELL | . | . | . | . | . | Rahway. |
| G. A. ANDERSON | . | . | . | . | . | Trenton. |
| B. P. HOWELL | . | . | . | . | . | Woodbury. |

PENNSYLVANIA.

| | | | | | | |
|--------------|---|---|---|---|---|----------------|
| H. J. REEDER | . | . | . | . | . | Easton. |
| B. L. HEWITT | . | . | . | . | . | Hollidaysburg. |
| JAMES DUFFY | . | . | . | . | . | Marietta. |

MARYLAND.

| | | | | | | |
|----------------|---|---|---|---|---|------------|
| T. B. FERGUSON | . | . | . | . | . | Baltimore. |
| T. DOWNES | . | . | . | . | . | Denton. |

VIRGINIA.

| | | | | | | |
|---------------------|---|---|---|---|---|-------------|
| A. MOSELY | . | . | . | . | . | Richmond. |
| Dr. W. B. ROBERTSON | . | . | . | . | . | Lynchburg. |
| M. C. ELLZEY | . | . | . | . | . | Blacksburg. |

ALABAMA.

| | | | | | | |
|----------------------|---|---|---|---|---|-------------|
| CHARLES S. G. DOSTER | . | . | . | . | . | Montgomery. |
| RO. TYLER | . | . | . | . | . | Montgomery. |
| D. R. HUNDLEY | . | . | . | . | . | Courtland. |

OHIO.

| | | | | | | |
|------------------------|---|---|---|---|---|------------|
| JOHN C. FISHER | . | . | . | . | . | Coshocton. |
| ROBERT CUMMINGS | . | . | . | . | . | Toledo. |
| JOHN H. KLIPPART | . | . | . | . | . | Columbus. |
| EMORY D. POTTER, Supt. | . | . | . | . | . | Toledo. |

MICHIGAN.

| | | | | | | |
|-------------------------|---|---|---|---|---|-----------|
| ANDREW J. KELLOGG | . | . | . | . | . | Allegan. |
| GEORGE CLARK | . | . | . | . | . | Ecorse. |
| E. R. MILLER | . | . | . | . | . | Richland. |
| GEORGE H. JEROME, Supt. | . | . | . | . | . | Niles. |

IOWA.

| | | | | | | |
|-------------------|---|---|---|---|---|-----------|
| SAMUEL B. EVANS | . | . | . | . | . | Ottumwa. |
| B. F. SHAW | . | . | . | . | . | Anamosa. |
| CHARLES A. HAYNES | . | . | . | . | . | Waterloo. |

MINNESOTA.

| | | | | | | |
|-----------------|---|---|---|---|---|-----------|
| WILLIAM GOLCHER | . | . | . | . | . | St. Paul. |
| R. O. SWEENEY | . | . | . | . | . | St. Paul. |
| GROVER C. BURT | . | . | . | . | . | Mankato. |

CALIFORNIA.

| | |
|------------------------------|----------------|
| B. B. REDDING | San Francisco. |
| S. R. THROCKMORTON | San Francisco. |
| J. D. FARWELL | San Francisco. |

DOMINION OF CANADA.

| | |
|--------------------------|-----------|
| W. F. WHITCHER | Ottawa. |
| W. H. VENNING | St. John. |

ARKANSAS.

| | |
|--------------------------|---------------|
| N. H. FISH | Pine Bluffs. |
| J. R. STEELMAN | Little Rock. |
| N. B. PEARCE | Fayetteville. |

WISCONSIN.

| | |
|-------------------------|-------------|
| A. PALMER | Boscabel. |
| WILLIAM WELCH | Madison. |
| P. R. HOY | Racine. |
| A. F. DONSMAN | Waterville. |

UTAH TERRITORY.

| | |
|--------------------------|-----------------|
| A. P. ROCKWOOD | Salt Lake City. |
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KENTUCKY.

| | |
|-------------------------------|------------------|
| P. H. DARBEY | Caldwell County. |
| POLK LAFFOON | Hopkins “ |
| Dr. S. W. COOMBS | Warren “ |
| Hon. C. J. WALTON | Hart “ |
| PACK THOMAS | Jefferson “ |
| Hon. JAMES B. CASEY | Kenton “ |
| Hon. JOHN A. STEELE | Woodford “ |
| J. H. BRUCE | Garrard “ |
| Gen. T. T. GARRARD | Clay “ |
| W. C. ALLEN | Bath “ |

GEORGIA.

| | |
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| THOMAS P. JANES | Atlanta. |
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ILLINOIS.

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| W. A. PRATT | Elgin. |
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NEVADA.

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| H. G. PARKER | |
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COLORADO.

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| WILSON E. SISTEY | Brookvale. |
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NORTH CAROLINA.

| | |
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| Gov. Z. B. VANCE | Raleigh. |
| Professor W. C. KERR | Raleigh. |
| President R. P. BATTLE | Chapel Hill. |
| Col. S. M. HOLT | Haw River. |
| Capt. S. B. ALEXANDER | Charlotte. |
| Major JONATHAN EVANS | Fayetteville. |
| Capt. J. R. THISPAN | Tarborough. |

[B.]

LISTS OF PONDS LEASED

By the Commissioners on Inland Fisheries, under authority given by Chap. 384, Sect. 9, of the Acts of 1869.¹

1870.

- Feb. 1. Waushakum Pond, in Framingham, to Sturtevant and others, 20 years.
Mar. 1. Tisbury Great Pond, in Tisbury and Chilmark, to Allen Look and others, 10 years.
April 1. Mendon Pond, in Mendon, to Leonard T. Wilson and another, 20 years.
June 20. Silver Lake, in Wilmington, to Charles O. Billings and others, 20 years.
Sept. 12. Baptist Lake, in Newton, to J. F. C. Hyde and others, 20 years.
Oct. 15. Archer's Pond, in Wrentham, to William E. George, 15 years.

1871.

- Jan. 10. Nine Mile Pond, in Wilbraham, to B. F. Bowles, 10 years.
30. Little Pond, in Falmouth, to F. H. Dimmick, 10 years.
April —. Spectacle, Triangle, and Peters Ponds, in Sandwich, to G. L. Fessenden and another, 5 years.
17. Long Pond, in Falmouth, to Joshua S. Bowerman and 3 others, 20 years.
May 15. Pratt's Pond, in Upton, to D. W. Batcheller, 20 years.
18. Little Sandy Pond, in Plymouth, to William E. Perkins, 15 years.
Nov. 1. Punkapoag Pond, in Randolph and Canton, to Henry L. Pierce, 20 years.

1872.

- Jan. 1. Sandy Pond, Forest Lake, or Flint's Pond, in Lincoln, to James L. Chapin and others, 20 years.

¹ We would remind lessees of ponds that they are required, by their leases, to use all reasonable efforts to stock their ponds, and keep accurate records of the same, and make returns of their doings to the Commissioners on the *1st of October*, each year, of the number and species of fish which they have put in or removed from their ponds. Any failure to comply with these conditions is a breach of contract invalidating their lease. It is important that the State should know just what is being done; and, where there appears to be mismanagement, or apparent failure, the Commissioners will visit the ponds, and ascertain, if possible, the cause.

1872.

- April 1. Onota Lake, in Pittsfield, to William H. Murray and others, 5 years.
 July 20. Little Pond, in Braintree, to Eben Denton and others, 20 years.

1873.

- May 1. Meeting-house Pond, in Westminster, to inhabitants of Westminster, 15 years.
 1. Great Pond, in Weymouth, to James L. Bates and others, 15 years.
 July 1. Little Sandy Pond, in Pembroke, to A. C. Brigham and others, 16 years.
 Sept. 1. Pontoosuc Lake, in Pittsfield and Lanesborough, to E. H. Kellogg and others, 15 years.
 Oct. 1. Farm Pond, in Sherborn, to inhabitants of Sherborn, 15 years.
 1. Spot Pond, in Stoneham, to inhabitants of Stoneham, 15 years.
 Nov. 1. Lake Chaubunagungamong, or Big Pond, in Webster, to inhabitants of Webster, 5 years.
 Dec. 1. Lake Wauban, in Needham, to Hollis Hunnewell, 20 years.

1874.

- Mar. 1. Walden and White ponds, in Concord, to inhabitants of Concord, 15 years.
 2. Upper Nankeag, in Ashburnham, to inhabitants of Ashburnham, 20 years.
 April 1. Elder's Pond, in Lakeville, to inhabitants of Lakeville, 15 years.
 20. North and South Podunk ponds, in Brookfield, to inhabitants of Brookfield, 15 years.
 May 2. Brown's Pond, in Peabody, to John L. Shorey, 15 years.
 1. Maquan Pond, in Hanson, to the inhabitants of Hanson, 15 years.
 16. Wickaboag Pond, in West Brookfield, to Lemuel Fullam, 15 years.
 20. Unchechewalom and Massapog ponds, to the inhabitants of Lunenburg, 20 years.
 July 1. Hardy's Pond, in Waltham, to H. E. Priest and others, 15 years.
 1. Hockomocko Pond, in Westborough, to L. N. Fairbanks and others, 15 years.
 11. Mitchell's Pond, in Boxford, to R. M. Cross and others, 15 years.
 11. Hazzard's Pond, in Russell, to N. D. Parks and others, 20 years.
 Oct. 1. East Waushacum Pond, in Sterling, to inhabitants of Sterling, 20 years.
 20. Middleton Pond, in Middleton, to inhabitants of Middleton, 15 years.

1875.

- Jan. 1. White and Goose Ponds, in Chatham, to George W. Davis, 15 years.
- Mar. 1. Lake Pleasant, in Montague, to inhabitants of Montague, 10 years.
1. Hood's Pond, in Ipswich and Topsfield, to inhabitants of Topsfield, 15 years.
- April 1. Chauncey Pond, in Westborough, to inhabitants of Westborough, 15 years.
3. West's Pond, in Bolton, to J. D. Hurlburt and others, 15 years.
15. Gates Pond, in Berlin, to E. H. Hartshorn and others, 15 years.
24. Pleasant Pond, in Wenham, to inhabitants of Wenham, 15 years.
- May 1. Morse's Pond, in Needham, to Edmund M. Wood, 15 years.
1. Great Pond, in North Andover, to Eben Sutton and others, 20 years.
1. Chilmark Pond, in Chilmark, to J. Nickerson and others, agents, 20 years.
- July 1. Winter Pond and Wedge Pond, in Winchester, to inhabitants of Winchester, 15 years.
1. Haggett's Pond, in Andover, to inhabitants of Andover, 20 years.
- Aug. 1. Oyster Pond, in Edgartown, to J. H. Smith and others, 20 years.
7. West Waushacum Pond, in Sterling, to inhabitants of Sterling, 20 years.
9. Mystic (Upper) Pond, in Winchester, Medford, and Arlington, to inhabitants of Winchester and Medford, 15 years.
- Oct. 1. Little Chauncey and Solomon Ponds, in Northborough, to inhabitants of Northborough, 15 years.

1876.

- Feb. 1. Great Sandy Bottom Pond, in Pembroke, to Israel Thrasher and others, 15 years.
- Mar. 1. Dennis Pond, in Yarmouth, to inhabitants of Yarmouth, 15 years.
1. Crystal Lake, in Wakefield, to Lyman H. Tasker and others, 15 years.
20. Lower Naumkeag Pond, in Ashburnham, to inhabitants of Ashburnham, 18 years.
28. Dennison Lake, in Winchendon, to inhabitants of Winchendon, 15 years.
28. Phillipston Pond, in Phillipston, to inhabitants of Phillipston, 20 years.
- May 8. South-West Pond, in Athol, to Adin H. Smith and others, 15 years.
- June 1. Norwich Pond, in Huntington, to inhabitants of Huntington, 20 years.

1876.

- June 10. Dug Pond, in Natick, to W. P. Bigelow and others, 15 years.
Oct. 1. Farm and Learned's Pond, in Framingham, to inhabitants of Framingham, 15 years.
1. Whitney's Pond, Wrentham, to inhabitants of Wrentham, 15 years.
1. Little Pond, in Barnstable, to George H. Davis, 15 years.

1877.

- Mar. 1. Nine Mile Pond, in Wilbraham, to inhabitants of Wilbraham, 15 years.
15. Pentucket and Rock Ponds, in Georgetown, to inhabitants of Georgetown, 15 years.
Aug. 10. Onota Lake, in Pittsfield, to William H. Murray and others, 15 years.
Oct. 1. Fort, Great Spectacle, and Little Spectacle Ponds, in Lancaster, to inhabitants of Lancaster, 20 years.
1. Battacook Pond, in Groton, to George S. Graves and others, 15 years.
Nov. 1. Tispaquin Pond, in Middleborough, to Abishai Miller, 15 years.
1. Asnebumskitt Pond, in Paxton, to Ledyard Bill and others, 15 years.

1878.

- Jan. 1. Sniptuit, Long, Snow, and Mary's Ponds, in Rochester, to inhabitants of Rochester, 15 years.
Mar. 16. Asnaconcomic Pond, in Hubbardston, to Amory Jewett, jun., 15 years.
April 1. Dorrity Pond, in Millbury, to inhabitants of Millbury, 10 years.
May 1. Spectacle, Peters, and Triangle Ponds, in Sandwich, to George L. Fessenden, 10 years.
• 1. Bear Hill Pond and Hall Pond, in Harvard, to inhabitants of Harvard, 15 years.
July 1. Lake Buell, in Monterey and New Marlborough, to Andrew L. Hubbell and others, 5 years.
Oct. 1. Eel Pond, in Melrose, to J. A. Barrett and others, 15 years.
Halfway Pond, in Plymouth, taken by Commissioners for 5 years from March 1, 1878, in accordance with provisions of chap. 62 of the Acts of 1876.

[C.]

HARWICHPORT, NOV. 28, 1878.

E. A. BRACKETT, *Commissioner on Inland Fisheries.*

Dear Sir, — I took the brook of the town in 1869 for 10 years: the time has now expired.

The number of alewives for each year is as follows: —

| | | | | | | | | | | | |
|------|---|---|---|---|---|---|---|---|---|---|--------------|
| 1869 | . | . | . | . | . | . | . | . | . | . | 312 barrels. |
| 1870 | (This year you ordered fishway put in). | . | . | . | . | . | . | . | . | . | 360 " |
| 1871 | . | . | . | . | . | . | . | . | . | . | 496 " |
| 1872 | . | . | . | . | . | . | . | . | . | . | 634 " |
| 1873 | . | . | . | . | . | . | . | . | . | . | 739 " |
| 1874 | . | . | . | . | . | . | . | . | . | . | 939 " |
| 1875 | . | . | . | . | . | . | . | . | . | . | 722 " |
| 1876 | (Bluefish came, and drove them away). | . | . | . | . | . | . | . | . | . | 558 " |
| 1877 | . | . | . | . | . | . | . | . | . | . | 1,161 " |
| 1878 | . | . | . | . | . | . | . | . | . | . | 1,570 " |

For the first 2 years there were 2 weirs to the south-west of the river, but being unprofitable were removed. They were about a mile and a half distant, and I do not think were any detriment to alewives in the river. To the east there have always been 2 pounds, — one near the shore, about a mile from the river, the other farther off in deep water. The one inshore took considerable many alewives. I think the fishways which you ordered were a great improvement; and I am indebted to you, one of the Commissioners, for the increase of fish. I think, if all have done as well as the Fish Commission, the State owes them a debt of gratitude. Those who had the brook previous to my taking it lost money, and the last year the Town allowed them nearly \$300. You see, it has been the reverse since I have had it: I have always kept alewives running up every day when they came in any quantities; and, as you remarked to me, "Let them go up, and give them free pass down, and you will have plenty of alewives." I found you were correct. But I fear some one will take it now who will soon make the brook worthless again. Any further information I will readily forward to you.

Yours truly,

NATHAN DOANE.

To the Commissioners on Inland Fisheries of Massachusetts.

GENTLEMEN, — In compliance with your request that I furnish you with the facts concerning the fisheries in the towns of Bridgewater, East

Bridgewater, West Bridgewater, and Halifax, Plymouth County, I am led first to remark that these towns are so situated geographically, being contiguous, as to have a common interest in this respect.

The Town River, which rises in Nippenicket Pond in Bridgewater, flows through a portion of West Bridgewater, and again entering the territory of Bridgewater forms the westerly branch of the Taunton River.

The Satucket River rises in Robins's Pond, East Bridgewater, and flows thence through the central part of this town into Bridgewater, there uniting with the Town River, forming the easterly branch of the Taunton River.

In Halifax are three large ponds, known as East and West Monponset, and Stump Pond, all connected, which discharge their waters through Monponset River or Brook, into Robins's Pond. The Town River has three principal tributaries, — Cowesit and West-Meadow Brook, in West Bridgewater, and South Brook, in Bridgewater.

The Satucket has two important tributaries: namely, Matfield River, which rises south of the Blue Hills, in Stoughton, and bears, in different parts of its course, three distinct names, Salisbury, Matfield, and John's River; and the Poor-Meadow River, which flows through portions of Abington and Hanson. Into the Matfield flow two good-sized brooks, namely, Beaver and Byram's, or Forge. Anciently a distinction was made between certain portions of what is now known as Taunton River. That part of it between the point of union of the Town and Satucket, and a place called Titicut, in Bridgewater, was called the Great River, and from Titicut to the sea, Taunton Great River; and formerly, also, a portion of Town was called Mill River, and of Satucket, Poor-Meadow River.

The Monponset Ponds in Halifax are very extensive, and in some parts quite deep; but the waters are somewhat colored, by reason of their swampy surroundings, though the shores in several places are composed of a fine white sand, and are well adapted for spawning-grounds. Robins's Pond is about a half-mile in width, surrounded by sandy shores and marshy shallows. The Nippenicket Pond is also a large pond, and one of the finest for the culture of fish to be found in Massachusetts.

All these streams formerly swarmed with alewives and shad, and other migratory fish; but in the year 1819 the Legislature, very unwisely, relieved the owners of dams in the towns of Bridgewater, East Bridgewater, West Bridgewater, and Halifax, from the obligation to keep up or maintain fishways.

The first dam on the Taunton River is at Squawbetty, or East Taunton, where a way has always existed, but which has long been inadequate for the passage of shad, and has this year been replaced by a large Brackett-way. Between Squawbetty and the paper-mill in Bridgewater, — a distance of about 12 miles, — there are no obstructions to the passage of fish; but at the latter place is a long, rolling dam. In compliance with chap. 190, Acts of 1872, the owners of this dam put in a fine Brackett-way, 80 feet long, and 5 feet in width. There are two dams

on the Town River, one on the Satucket, and one on Monponset Brook, all of which have been furnished with suitable ways, except that in West Bridgewater, which is soon to be replaced by a Brackett-way.

In May, 1872, the four towns named began the work of stocking their ponds and rivers with alewives. These were obtained at the fishing-places on the Nemasket River in Middleborough, taken alive, and transported in tanks to their respective repositories,—Nippenicket Pond in Bridgewater, Robins's Pond in East Bridgewater, and Monponset Pond in Halifax. This process was repeated in 1873, and again in 1874, making three successive years. Into Nippenicket were placed in 1872 about 1,000 alewives, in 1873 500, and in 1874 about 2,000,—the fish for this pond being transported a distance of about four miles. The stocking of Robins's and Monponset Ponds—the distance from Middleborough being more than double that of Nippenicket, and the fish consequently dying in large numbers on the passage—was not attended with so much success: yet in the three years about 3,000 live, healthy alewives were safely deposited in these three ponds.

Beside these experiments in 1875, there were put into the Town River 80,000 shad-fry, in 1876 10,000 California salmon-fry, in 1877 4,000 land-locked salmon-fry, and in the same year 60,000 shad-fry. Into the Satucket River in 1872 were put 30,000 shad-fry, and in 1877 4,000 land-locked salmon-fry.

The whole experiment was looked upon by the people with distrust, and by some with absolute disfavor, though the several towns willingly made all needed appropriations; and the owners of dams, though subjected to considerable expense, complied with the statute with a promptness and willingness that entitle them to great credit.

It was announced that the alewives bred in the year 1872 would return full-grown in 1875, but there were few who believed it; and accordingly, in the spring of the latter year, the streams and ways were carefully watched by many incredulous eyes. The season was a little late and cold; but before the end of May the alewives, in considerable numbers, appeared at the foot of Paper-Mill dam, and, in the course of a few days, at all the other dams, making a successful passage over every way into the ponds where they were respectively bred, the two schools apparently parting, at the junction of the Town and Satucket Rivers, with the precision of a well-disciplined army, though a few stragglers were found in nearly all the tributaries named.

The run has gradually increased each year since; and last spring, being the first time that the towns have fished since the year 1818, about 15,000 fine large alewives were seined at the Paper Mill, the common fishing-ground agreed upon by the four towns. A much larger number would have been taken, had it not been for the lateness when the fishing commenced, and the failure to suitably prepare the bed of the river for seining.

None of the other fish have yet been discovered in our rivers; though the fishermen on the lower waters of the Taunton have, since 1876, reaped a larger harvest of both shad and alewives—the result of our sowing, and that of the people of Middleborough—than in many years previously.

The establishment of the fishways has increased the number of all the common fresh-water fish in our ponds and rivers, especially the white perch, which have come in large numbers with the herrings, and among them, also, trout and black bass. The trout and bass pass the ways just as successfully as the alewives; and of the former several have been taken since 1872, of 1 and 2 pounds in weight.

It is confidently believed, and the result of the experiment thus far justifies such belief, that not only will our ancient and valuable alewife-fisheries be fully restored, but that of the shad also, provided the laws are strictly enforced with reference to the lower waters of the Taunton, where there has always been much excessive and illegal fishing, and where the fishermen claim to believe, that, no matter how many fish they capture, there are just as many left in the stream as though they had not taken any, — in other words, that 99 from 100 leaves 100, and not 1.

Yours truly,

WILLIAM H. OSBORNE.

[D.]

LEGISLATION. — 1876.

[Omitted in last Report.]

AN ACT FOR THE PROTECTION OF TROUT, LAND-LOCKED SALMON,
AND LAKE TROUT.

Be it enacted by the Senate and House of Representatives, in General Court assembled, and by the authority of the same, as follows :

SECTION 1. Whoever, within this Commonwealth, sells, offers for sale, exposes for sale, or has in his possession, trout, land-locked salmon, or lake trout, except alive, between the first day of October in each year, and the next succeeding first day of April, shall forfeit, for each fish taken, caught, or killed, between the first day of October in each year, and the next succeeding first day of April, and so sold, offered for sale, exposed for sale, or had in his possession, the sum of ten dollars; and, in all prosecutions under this Act, the burden of proof shall be upon the defendant to show that the trout, land-locked salmon, or lake trout (the selling, offering for sale, exposing for sale, or possession of which is the subject of the prosecution) were legally caught.

SECT. 2. The mayor or aldermen of any city, the selectmen of any town, and all police officers and constables within this Commonwealth, shall cause the provisions of this act to be enforced in their respective cities and towns; and all forfeitures and penalties for violations of the provisions of this Act shall be paid, one-half to the person making the complaint, and one-half to the city or town in which the offence is committed.

SECT. 3. All acts and parts of acts conflicting with this Act are hereby repealed, so far as they are inconsistent herewith.

SECT. 4. This act shall take effect upon its passage.

1878.

[CHAP. 32.]

AN ACT TO AMEND CHAPTER ONE HUNDRED AND NINETY OF THE
ACTS OF THE YEAR EIGHTEEN HUNDRED AND SEVENTY-TWO, RE-
LATING TO THE ALEWIFE AND OTHER FISHERIES IN THE TOWNS
OF BRIDGEWATER, WEST BRIDGEWATER, EAST BRIDGEWATER, AND
HALIFAX.

Be it enacted, &c., as follows :

SECTION 1. Section three of chapter one hundred and ninety of the acts of the year eighteen hundred and seventy-two is hereby amended by

adding after the word "flow," at the end of said section, the following words: "And it shall be lawful for said towns to agree upon and take said fish at one common fishing-place for all of said towns, upon either of said rivers or their tributaries, within their limits or upon that portion of the Taunton River within the limits of the town of Bridgewater; to regulate the taking of said fish under the direction of said commissioners, and to determine the manner in which the expense attending such common fishing shall be apportioned between them, and to make all necessary appropriations therefor."

SECT. 2. This act shall take effect upon its passage. [*Approved March 2, 1878.*]

[CHAP. 78.]

AN ACT CONCERNING SHELL-FISH ON THE SHORES AND FLATS OF THOMPSON'S ISLAND.

Be it enacted, &c., as follows:

SECTION 1. Whoever takes any shell-fish from the shores or flats of Thompson's Island in Boston Harbor without the permit of the managers of the Boston Asylum and Farm School for Indigent Boys, or the chief of the police of the city of Boston, shall for every offence pay a fine of not less than five dollars or more than ten dollars, and costs of prosecution; said fine to be recovered by complaint before the municipal court of the city of Boston.

SECT. 2. Any constable or police-officer of the city of Boston may without a warrant arrest any person whom he finds in the act of taking shell-fish in violation of the provisions of the preceding section of this act, or in the act of carrying away shell-fish so taken, and detain him in some place of safe keeping until a warrant can be procured against such person upon a complaint for said offence: *provided*, that such detention shall not exceed twenty-four hours. [*Approved March 23, 1878.*]

[CHAP. 172.]

AN ACT TO AMEND CHAPTER THREE HUNDRED AND EIGHTY-FOUR OF THE ACTS OF THE YEAR EIGHTEEN HUNDRED AND SIXTY-NINE, CONCERNING THE CULTIVATION OF FISHES.

Be it enacted, &c., as follows:

SECTION 1. Whoever uses any sweep-seine in the waters of the Connecticut, Westfield, Deerfield, Miller's, Merrimack, Nashua, or Housatonic rivers, or their tributaries, having a mesh which stretches less than five inches, shall forfeit for the first offence twenty-five dollars, and for every subsequent offence fifty dollars; and in each case shall also forfeit the apparatus thus unlawfully used, and the fish captured.

SECT. 2. Section twenty-one of chapter three hundred and eighty-four of the acts of the year eighteen hundred and sixty-nine is hereby repealed.

SECT. 3. This act shall take effect on the first day of December next. [*Approved April 23, 1878.*]

[CHAP. 179.]

AN ACT FOR THE BETTER PROTECTION OF THE OYSTER FISHERIES IN
THIS COMMONWEALTH.

Be it enacted, &c., as follows:

SECTION 1. No person shall dig, take, or carry away any oysters by any method whatever, from any flats or creeks, for which a license has been granted under the provisions of section sixteen of chapter eighty-three of the General Statutes, between sunset and sunrise. Any person holding a license under the provisions of said section, who shall violate the foregoing provisions, shall, upon conviction thereof, in addition to the penalties hereinafter provided, forfeit his license, together with the oysters remaining on the premises licensed, to the town or city granting the same.

SECT. 2. Any person who shall violate any of the provisions of this Act, and any person who digs or takes any oysters from any flats or creeks described in any license granted under the provisions of section sixteen of chapter eighty-three of the General Statutes, during the continuance of such license, without the consent of the person so licensed, shall be punished by a fine not more than one hundred dollars, or imprisonment in the house of correction not less than thirty days nor more than six months, or by both said fine and imprisonment. One half of said fine shall be paid to the complainant, and the other to the county within whose jurisdiction the offence was committed.

SECT. 3. This act shall take effect on the first day of June next.
[Approved April 24, 1878.]

[CHAP. 202.]

AN ACT TO PRESERVE THE EEL FISHERIES IN IPSWICH RIVER AND
ITS TRIBUTARIES IN THE TOWN OF IPSWICH.

Be it enacted, &c., as follows:

SECTION 1. Whoever takes, catches, or destroys any eels in Ipswich River or its tributaries, in the town of Ipswich in the county of Essex, in any other manner than by spear, or hook and line, shall forfeit for every eel so taken, caught, or destroyed, not less than one dollar nor more than five dollars; one-half of said fine to be paid to the complainant.

SECT. 2. All fines or penalties for violating this act, with costs, may be recovered by complaint or action of tort in any court of competent jurisdiction.

SECT. 3. This act shall take effect upon its passage. [Approved April 29, 1878.]

[CHAP. 224.]

AN ACT TO FURTHER REGULATE FISHING IN THE CONNECTICUT RIVER.

Be it enacted, &c., as follows:

SECTION 1. Section three of chapter one hundred and forty-four of the acts of the year eighteen hundred and seventy-four, is hereby amended by striking out the word "four," where it first occurs in said section, and inserting in lieu thereof the word "two."

SECT. 2. Whoever takes or catches any fish beyond two hundred yards and within four hundred yards of any fishway now built, or hereafter to be built on the Connecticut River or its tributaries lying within this Commonwealth, in any other manner than by naturally or artificially baited hooks and line, shall forfeit for each fish so taken or caught the sum of twenty-five dollars.

SECT. 3. The limitation of time for catching black bass in the Connecticut River or its tributaries, in this State, shall hereafter be the same as that now fixed, or which shall hereafter be prescribed by the Legislature of Connecticut for taking black bass in said river in that State.

SECT. 4. This act shall take effect upon its passage. [*Approved May 3, 1878.*]

[E.]

RETURNS OF WEIRS, SEINES, AND GILL-NETS.

In the following tables will be found the returns of 52 weirs; 28 sea-seines; 97 gill-nets; 6 seines at the mouth of the Merrimack; 7 seines in the Connecticut, 9 in the Merrimack, and 10 in the Taunton; also 29 fresh-water fisheries by seine or by dip-net. The numbers are approximate. Some returns are made with more care and fidelity than others. In certain cases, the barrels or the pounds were given, and the number of fish could not be accurately known. Sometimes a fisherman has included two or three fisheries in one, adding to his weir, perhaps, some line-fishing or eeling with pots. We are to suppose that the twenty-five trout mentioned were taken with hook and line, as their capture by net is illegal.

On the whole, the fishermen have been willing and prompt in complying with the law, and the Commissioners have been careful to enforce it gently. Only in one case was an example made by the arrest of the delinquent, who was compelled by the court to make his return.

General deductions from the tables are purposely omitted until the material of several years has been accumulated. It may, however, be said, in general, that, as compared with last year, sea-herring, mackerel, and flat-fish have fallen off; while bass, tautog, scup, menhaden, and bluefish are more plenty. In shad there was an average season in the Connecticut, as compared with the extraordinary scarcity of last year, while the Taunton River yielded a very small crop. The great increase of alewives is encouraging,—an increase most beneficial, and easy to effect, as may be seen by the letter of Mr. Doane in the appendix.

TABLE NO. I. — POUNDS AND WEIRS. — Showing the Catch of each during 1879.

| No. on Map. | Town or Place. | Proprietor. | Shad. | Sea-Herring. | Striped Bass. | Alwives. | Squeelague. | Mackerel. | Spanish Mackerel. | Tautog. | Flounders and Flat-Fish. | Scup. | Menhaden. | Bluefish. | Eels. | Dog-Fish. | Frost-Fish. |
|-------------|------------------|-----------------------|-------|--------------|---------------|----------|-------------|-----------|-------------------|---------|--------------------------|-------|-----------|-----------|-------|-----------|-------------|
| | North Scituate . | D. L. Wood . | 7 | . | 1 | 7,558 | 1 | 77,931 | 1 | 50 | 517 | 1 | 38,251 | 210 | 1 | 1 | 1 |
| | Plymouth . | William S. Hadaway . | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 |
| | Barnstable . | Benjamin Lovell . | 3 | 1 | 711 | 1 | 1 | 334 | 1 | 89 | 1 | 1 | 1 | 3,169 | 1 | 1 | 1 |
| | " | B. G. Phillips . | 131 | 1 | 1 | 1,977 | 1 | 268 | 1 | 105 | 128 | 3,300 | 1 | 1 | 1 | 1 | 1 |
| | " | G. A. Smith . | 1 | 1 | 1,574 | 1 | 1 | 18,812 | 1 | 64 | 10,716 | 1 | 1 | 13,501 | 623 | 1 | 1 |
| | Brewster . | Freeman Atwood . | 33 | 1 | 341 | 1,436 | 1 | 94 | 1 | 65 | 13 | 4 | 4,166 | 8,283 | 112 | 1 | 1 |
| | " | Cahoon & Ellis . | 42 | 1 | 10 | 1,302 | 1 | 1 | 1 | 1,331 | 1,288 | 113 | 1 | 24,416 | 1 | 1 | 1 |
| | " | V. B. Newcomb . | 64 | 1 | 1 | 9,290 | 2 | 58,238 | 1 | 1 | 1 | 1 | 9,131 | 8,210 | 1 | 1 | 1 |
| | " | W. C. Parker . | 10 | 1 | 172 | 1,623 | 1 | 31 | 1 | 1 | 1 | 1 | 1 | 2,379 | 1 | 1 | 1 |
| | East Brewster . | Z. H. Rogers . | 1 | 1 | 42 | 1 | 1 | 50 | 2 | 20 | 7 | 1 | 6,000 | 8,017 | 487 | 1 | 1 |
| | Orleans . | Isaac Hopkins . | 1 | 1 | 3 | 1 | 1 | 1,540 | 1 | 9 | 1 | 1 | 1 | 14,437 | 1 | 1 | 1 |
| | " | George S. Nickerson . | 27 | 12,000 | 205 | 1,152 | 1 | 1,785 | 1 | 113 | 2,564 | 4 | 23,086 | 26,081 | 14 | 1 | 1 |
| | " | L. H. Walker & Co. . | 19 | 1 | 252 | 360 | 1 | 748 | 1 | 159 | 1 | 1 | 16,935 | 37,786 | 1 | 1 | 1 |
| | Eastham . | A. K. Higgins . | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 3 | 1 | 1 | 19,842 | 1 | 1 | 1 |
| | " | A. M. Knowles . | 10 | 1 | 108 | 708 | 1 | 685 | 1 | 240 | 1 | 1 | 1 | 34,955 | 1 | 1 | 1 |
| | " | W. H. Nickerson . | 1 | 1 | 35 | 205 | 1 | 616 | 1 | 244 | 1 | 1 | 2,500 | 20,976 | 1 | 1 | 1 |
| | " | Philip Smith . | 90 | 1 | 181 | 3,390 | 1 | 3,405 | 1 | 186 | 1 | 1 | 9,000 | 67,915 | 1 | 1 | 1 |

TABLE NO. I. — POUNDS AND WEIRS — Continued.

| No. on Map. | TOWN OR PLACE. | PROPRIETOR. | Shad. | Sea-Herring. | Striped Bass. | Alewives. | Squeteague. | Mackerel. | Spanish Mackerel. | Tautog. | Flounders and Plat-Fish. | Scup. | Menhaden. | Bluefish. | Eels. | Dog-Fish. | Frost-Fish. |
|-----------------|--------------------------|--------------------------|-------|--------------|---------------|-----------|-------------|-----------|-------------------|---------|--------------------------|---------|-----------|-----------|-------|-----------|-------------|
| | Fairhaven . | Benjamin T. Dunn . | 6 | 9 | 39 | 19,001 | 30 | — | — | 801 | 541 | 2,401 | 17,223 | 322 | 21 | — | — |
| | " . | S. P. Dunn & O. Lapham . | 5 | 26 | 308 | 37,904 | 334 | — | — | 948 | 1,054 | 32,370 | 19,858 | 106 | 152 | — | — |
| | " . | George L. Hiller . | 5 | — | 48 | 21,132 | 119 | — | — | 773 | 1,816 | 16,982 | 16,343 | 38 | 9 | — | — |
| | " . | Frank P. Paine . | 1 | — | 128 | 9,031 | 113 | — | — | 2,331 | 513 | 5,375 | 21,575 | 2 | 1,525 | — | — |
| | " . | C. D. Sherman . | 6 | 29 | 80 | 27,551 | 376 | 1 | — | 1,011 | 630 | 35,373 | 38,816 | 39 | 343 | — | — |
| | " . | J. Sherman & O. Tilton . | — | — | — | — | 4 | — | — | 7 | 4 | 310 | 4,030 | 445 | 1,300 | — | — |
| | " . | " J. C. Allen . | 1 | — | 12 | 7,590 | 247 | — | — | 1,170 | 376 | 37,672 | 5,502 | 15 | 15 | — | — |
| Westport . | J. O. Rabbitt . | — | — | — | — | — | 45 | — | — | — | — | — | — | 4,344 | — | — | — |
| Somerset . | George H. Simmons . | — | — | — | — | 10,603 | — | — | — | — | — | — | — | — | — | — | — |
| North Tisbury . | J. Luce . | — | — | 25,000 | 1 | — | — | 25 | — | — | 200 | 45,000 | 105,000 | 500 | — | 500 | — |
| Tisbury . | Thomas E. Norton & Co. . | — | 4 | 31 | 21 | 10,197 | 11 | — | 2 | 75 | 284 | 687 | — | 41 | — | — | — |
| Chilmark . | P. M. Stuart & Co. . | — | — | — | 65 | 37,631 | 7 | 615 | — | 130 | 266 | 1,679 | 44 | 13 | — | — | — |
| Gosnold . | W. G. Rathbun . | — | 3 | — | 3 | 1,200 | 1,665 | — | — | 88 | — | 19,300 | 8,600 | 61 | — | — | — |
| Total . | | | 7,237 | 119,600 | 7,638 | 639,986 | 5,131 | 983,768 | 24 | 19,225 | 44,300 | 430,231 | 2,191,373 | 404,894 | 5,186 | 2,459 | 5,000 |

TABLE NO. II. — SALT-WATER SEINES. — Showing the Catch of each for 1878 — Concluded.

| TOWN OR PLACE. | PROPRIETOR. | Shad. | Sea-Herring. | Striped Bass. | Alwives. | Scup. | Squeteague. | Mackerel. | Tautog. | Flounders and Flat-Fish. | Bluefish. | Menhaden. | Eels. | Frost-Fish. | Perch. | Smelts. |
|-----------------|---------------------------|-------|--------------|---------------|-------------------|-------|-------------|-----------|---------|--------------------------|-----------|-----------|--------|-------------|--------|---------|
| Westport . . . | Perry Kirby . . . | 100 | 100 | — | 302 | 1 | 1 | 1 | 2 | 9 | — | 620 | 132 | — | 1 | 1 |
| “ . . . | James R. Lawton . . . | — | — | 4 | 700 | 1 | 1 | 1 | 1 | — | — | 1,160 | 10 | — | 1 | 1 |
| “ . . . | P. G. Potter . . . | 200 | 2,000 | — | — | 1 | 1 | 1 | 1 | — | — | 3,000 | — | — | 100 | — |
| Nantucket . . . | John B. Brooks . . . | — | — | — | — | 1 | 1 | 1 | 1 | — | 1,123 | — | — | — | — | — |
| “ . . . | H. B. Cash . . . | — | — | — | — | 1 | 1 | 1 | 1 | — | 1,085 | — | — | — | — | — |
| “ . . . | J. Hamblin . . . | — | — | — | — | 1 | 1 | 1 | 1 | — | 1,057 | — | — | — | — | — |
| “ . . . | William W. McCleave . . . | — | — | 20 | — | 1 | 1 | 1 | 1 | 12,020 | 215 | — | — | — | — | — |
| Edgartown . . . | S. G. Vincent . . . | — | — | 3,000 | 110,000 45,000 | 1 | 1 | 1 | 1 | — | 8,000 | — | 17,000 | — | 24,000 | — |
| “ . . . | J. H. Smith . . . | — | — | — | 22,000 | 1 | 1 | 1 | 300 | — | — | — | — | — | 38,600 | — |
| Tisbury . . . | A. Look . . . | — | — | — | 13,000 | 1 | 1 | 1 | 1 | — | — | — | — | — | 4,250 | 2,250 |
| “ . . . | J. Nickerson . . . | — | — | 1 | 12,267 | 1 | 1 | 1 | 1 | — | — | — | — | — | 300 | — |
| Total . . . | . . . | 200 | 2,100 | 3,693 | 482,419 | 1,138 | 8 | 16,228 | 387 | 12,965 | 69,330 | 258,708 | 17,755 | 503 | 67,364 | 2,250 |

1 Taken with hand-nets.

TABLE No. III. — GILL-NETS. — Showing the Catch for 1878.

| TOWN OR PLACE. | PROPRIETOR. | Shad. | Alewives. | Sea-Herring. | Striped Bass. | Scup. | Squeteague. | Dog-Fish. | Mackerel. | Bluefish. | Tautog. | Flounders and Flat- Fish. | Menhaden. | Eels. |
|----------------|---------------------|-------|-----------|--------------|---------------|-------|-------------|-----------|-----------|-----------|---------|---------------------------------|-----------|-------|
| Sandwich | J. Fisher | . | . | . | . | . | . | . | 915 | 124 | . | 1 | 8 | . |
| Barnstable | Th. S. Chase . . . | . | . | . | . | 2,522 | . | . | . | 103 | . | . | . | . |
| " | W. F. Carney . . . | . | . | . | 43 | . | . | . | . | 3,251 | . | . | . | . |
| " | James Hendren . . | . | . | . | . | . | . | . | . | 1,025 | . | 895 | . | . |
| " | T. Kelley | . | . | . | . | . | . | . | . | 184 | . | . | . | . |
| " | D. P. Nickerson . . | . | . | . | . | 98 | 4 | . | . | 743 | . | . | 38 | 68 |
| " | D. Rogers | . | . | . | . | . | . | . | . | 721 | . | . | . | . |
| " | M. Sturges & Son . | . | . | . | . | 563 | 63 | . | . | 2,091 | . | . | . | . |
| Orleans | J. Sparrow | . | . | . | 1 | . | . | . | 972 | 2,586 | . | . | . | . |
| " | J. Walker | . | . | . | . | . | . | . | . | 680 | . | . | . | . |
| " | Ed. T. Young . . . | . | . | . | . | . | . | . | . | 779 | . | 20 | . | . |
| East Orleans | S. Linnell | . | . | . | . | . | . | . | . | 450 | . | . | . | . |
| Wellfleet. | A. T. Gross | . | . | . | . | . | . | . | 928 | . | . | . | . | . |
| " | C. W. Smith | . | . | . | . | . | . | . | 327 | 948 | . | . | 24,707 | . |

TABLE No. III. — GILL-NETS. — Showing the Catch for 1878 — Continued.

| Town or Place. | Proprietor. | Shad. | Alwives. | Sea-Herring. | Striped Bass. | Sculp. | Squeteague. | Dog-Fish. | Mackerel. | Bluefish. | Tautog. | Flounders and Flat-Fish. | Menhaden. | Eels. |
|----------------|----------------------|-------|----------|--------------|---------------|--------|-------------|-----------|-----------|-----------|---------|--------------------------|-----------|-------|
| Provincetown. | D. H. Atkins . | . | . | . | . | . | . | . | 529 | 3,623 | . | . | . | . |
| " | Henry Atkins . | . | . | . | . | . | . | . | 505 | 355 | . | . | . | . |
| " | J. Atkins . | . | . | . | . | . | . | . | 296 | 222 | . | . | . | . |
| " | D. W. Atwood | . | . | . | . | . | . | . | 437 | 5,328 | . | . | . | . |
| " | F. M. Bowley . | . | . | . | . | . | . | . | 1,038 | - | . | . | . | . |
| " | N. Cook . | . | . | . | . | . | . | . | 2,536 | 162 | . | . | . | . |
| " | E. Doane . | . | . | . | . | . | . | . | 351 | 1,572 | . | . | . | . |
| " | J. B. Dyer . | . | 10 | . | . | . | . | . | 719 | - | . | . | 8 | . |
| " | William Dyer . | . | 160 | 256 | . | . | . | . | 685 | 1,358 | 7 | . | 62 | . |
| " | H. Freeman . | . | . | . | . | . | . | . | 758 | 1,377 | . | . | . | . |
| " | J. E. Freeman . | . | . | . | . | . | . | . | 906 | - | 35 | . | 7,800 | . |
| " | Prince Freeman | . | 2 | . | . | . | . | . | 881 | 2,717 | . | . | 139 | . |
| " | John Genn . | . | . | . | . | . | . | . | 208 | 359 | . | . | 77 | . |
| " | J. C. P. Harvender . | . | 516 | 3,415 | . | . | . | . | 2,566 | - | . | . | . | . |
| " | Levi B. Kelley . | . | . | . | . | . | . | . | 881 | 21 | . | . | . | . |
| " | G. Lewis . | . | . | . | . | . | . | . | 2,110 | 2,454 | . | . | . | . |
| " | H. J. Lewis | . | . | . | . | . | . | . | 2,380 | 2,986 | 10 | 18 | . | . |

[illegible]

TABLE No. III. — GILL-NETS. — *Showing the Catch for 1878* — Continued.

| TOWN OR PLACE. | PROPRIETOR. | Shad. | Alewives. | Sea-Herring. | Striped Bass. | Scup. | Squeteague. | Dog-Fish. | Mackerel. | Bluefish. | Tautog. | Flounders and Flat-Fish. | Menhaden. | Bels. |
|-----------------|---------------------|-------|-----------|--------------|---------------|-------|-------------|-----------|-----------|-----------|---------|--------------------------|-----------|-------|
| North Truro . | P. L. Palm . | . | 90 | 10 | . | . | . | . | 1,541 | 586 | . | . | 275 | . |
| " . | J. T. Stevens . | . | . | . | . | . | . | . | 512 | 259 | . | 50 | . | . |
| " . | E. P. Worthen . | . | . | . | . | . | . | . | 846 | 210 | . | . | . | . |
| Eastham . | R. Doane . | . | . | . | . | 8 | . | . | 633 | 7,003 | 130 | . | 500 | 4 |
| " . | F. Dill . | . | 4,000 | 34,000 | . | . | . | . | 876 | 12,167 | . | . | 2,000 | . |
| Chatham . | E. K. Bearne . | . | . | . | . | . | . | . | . | 2,716 | . | . | . | . |
| " . | A. Bloomer . | . | . | . | . | . | . | . | 650 | 730 | . | . | . | . |
| " . | E. Gould . | . | . | . | . | . | . | . | . | 590 | . | . | . | . |
| " . | J. Gould . | . | 93 | . | . | . | . | . | 756 | 5,420 | . | 30 | . | 138 |
| " . | A. Mayo . | . | . | . | . | . | . | . | 480 | . | . | . | . | . |
| " . | William Patterson . | . | . | . | . | . | . | . | 1,859 | 167 | . | . | . | . |
| " . | J. F. Smith . | . | . | . | . | . | . | . | 790 | . | . | . | . | . |
| South Chatham . | N. Eldredge . | . | . | . | . | . | . | . | 6 | . | . | . | 1,274 | . |
| " . | O. Eldredge . | . | . | 35 | . | . | . | . | 4 | . | . | . | 306 | . |
| Dennisport . | F. S. Crowell . | . | . | . | . | . | . | . | . | 3,035 | . | . | . | 1,743 |
| " . | A. Howland . | 18 | . | . | . | . | . | . | . | 959 | . | . | . | . |
| " . | F. Joseph . | . | . | . | . | . | . | . | . | 570 | . | . | . | . |

| | | | | | | | | | | | | | | | | | | |
|-------------|---|---|---|----------------------|---|---|---|---|---|---|-----|--------|-----|-----|-------|-----|-----|--------|
| Hyannis | . | . | . | D. Bearse. | . | . | . | . | . | . | | 3,608 | - | - | 3,800 | 459 | 10 | - |
| Centreville | . | . | . | C. E. Bearse | . | . | . | . | . | . | - | 1,518 | 15 | - | 1,358 | - | - | - |
| " | . | . | . | T. Fuller | . | . | . | . | . | . | - | - | 39 | - | 641 | 16 | - | - |
| " | . | . | . | William W. Hallett | . | . | . | . | . | . | - | - | - | - | 825 | - | - | - |
| " | . | . | . | T. F. Plimney | . | . | . | . | . | . | - | 1,472 | 2 | - | 1,326 | - | - | - |
| Cotuitport | . | . | . | J. A. Fish | . | . | . | . | . | . | 1 | 1,733 | - | - | 1,271 | 484 | 1 | - |
| " | . | . | . | A. C. Nickerson | . | . | . | . | . | . | 185 | 700 | - | - | 1,571 | - | 613 | 230 |
| Cotuit | . | . | . | C. B. Nickerson | . | . | . | . | . | . | - | 266 | - | - | 476 | - | - | 30,000 |
| Falmouth | . | . | . | E. H. Davis | . | . | . | . | . | . | - | - | 15 | - | 242 | - | - | - |
| " | . | . | . | H. G. Fisher | . | . | . | . | . | . | 1 | 24 | 108 | - | 1,492 | 4 | 189 | 7 |
| " | . | . | . | R. T. Handy | . | . | . | . | . | . | 59 | 75,829 | 58 | 216 | 228 | 384 | - | 1 |
| Fairhaven | . | . | . | J. J. Allen | . | . | . | . | . | . | - | - | - | - | - | - | - | 389 |
| " | . | . | . | J. C. & C. E. Allen | . | . | . | . | . | . | - | 105 | 6 | - | 677 | - | - | 249 |
| " | . | . | . | D. W. Deane | . | . | . | . | . | . | - | 648 | 21 | 49 | 1,381 | - | 3 | 4,367 |
| " | . | . | . | O. Lapham | . | . | . | . | . | . | - | - | 18 | - | 1,031 | - | - | 5,640 |
| " | . | . | . | S. P. Dunn | . | . | . | . | . | . | 2 | 22,760 | - | 285 | 7,381 | 296 | - | 711 |
| " | . | . | . | George L. Miller | . | . | . | . | . | . | - | - | 7 | - | 617 | - | - | 1,861 |
| " | . | . | . | F. P. Yaine | . | . | . | . | . | . | - | 325 | 22 | - | 331 | - | - | 895 |
| " | . | . | . | C. D. Sherman & Sons | . | . | . | . | . | . | - | 346 | 28 | - | 605 | - | - | 3,655 |
| Nantucket | . | . | . | I. Dunham | . | . | . | . | . | . | - | 30 | - | - | 543 | - | - | - |
| " | . | . | . | R. K. Dunham | . | . | . | . | . | . | - | 97 | - | - | 5,276 | - | - | - |
| " | . | . | . | D. H. Eldredge | . | . | . | . | . | . | - | 42 | - | - | 3,505 | - | - | - |

TABLE NO. III. — GILL-NETS. — Showing the Catch for 1878 — Concluded.

| TOWN OR PLACE. | PROPRIETOR. | Shad. | Alewives. | Sea-Herring. | Striped Bass. | Scup. | Squeteague. | Dog-Fish. | Mackerel. | Bluefish. | Tautog. | Flounders and Flat-Fish. | Menhaden. | Eels. |
|----------------|---------------------------------------|-------|-----------|--------------|---------------|--------|-------------|-----------|-----------|-----------|---------|--------------------------|-----------|-------|
| Nantucket | J. O. Freeman | — | — | — | — | 13 | — | — | — | 21,334 | — | — | — | — |
| " | Ch. K. Manter | — | — | — | — | — | — | — | — | 1,183 | — | — | — | — |
| " | Phinney & Snow ¹ | — | 6,979 | — | — | — | — | — | — | 2,639 | — | — | — | — |
| " | J. Small & Son | — | — | — | — | — | — | — | — | 2,976 | — | — | — | — |
| " | R. W. Padue | — | 25,902 | — | 153 | 3,103 | 73 | — | 8 | 1,328 | 1,125 | 1,920 | 14,638 | 1,639 |
| " | | 191 | 154,548 | 33,393 | 897 | 25,020 | 1,102 | 49 | 55,436 | 125,932 | 3,519 | 9,763 | 285,807 | 4,073 |

¹ Also with seine.² Also taken with hook and line, 588.

TABLE NO. IV.—CONNECTICUT RIVER SEINES.

| TOWN. | NAME. | Shad. | Striped Bass. | Black Bass. | Sturgeon. | Pike. | Salmon. |
|--------------------------|---------------------------|--------|---------------|-------------|-----------|-------|---------|
| Agawam | A. Converse | 1,261 | | | - | | - |
| " | A. J. Hills | 307 | | | - | | - |
| South Hadley | C. C. Smith | 8,169 | | | - | | 12 |
| Chicopee | J. H. & W. Chapin | 3,012 | | | - | | - |
| Holyoke | Hampden Landing Fish Co.. | 921 | | | 21 | | - |
| West Springfield | G. A. White | 1,528 | | | - | | - |
| Springfield | R. H. Parker | 2,592 | | | - | | - |
| | | 17,790 | | | 21 | | 2 |

¹ Taken alive and set free.

TABLE NO. V.—MERRIMAC RIVER SEINES.

| TOWN. | NAME. | Shad. | Alewives. | Striped Bass. | Perch. |
|----------------------|------------------------------|-------|-----------|---------------|--------|
| Bradford | H. A. Nisbett | 478 | - | 21 | - |
| Newbury | A. E. Larkin | - | 35,700 | - | - |
| " | W. H. Morrison | - | 18,950 | - | - |
| " | A. C. Nelson | - | 78,209 | 97 | 460 |
| " | William N. Dempsey | 48 | 356 | 5 | - |
| West Newbury | W. P. Goodwin | 1,547 | - | 10 | - |
| Groveland | F. H. Balch | 667 | - | 4 | - |
| " | Charles W. Pemberton | 406 | - | - | - |
| Amesbury | John Morrill | 4,159 | - | 6 | - |
| | | 7,305 | 133,215 | 143 | 460 |

TABLE NO. VI. — TAUNTON RIVER SEINES.

| TOWN. | NAME. | Shad. | Alewives. | Striped Bass. |
|---------------------|-------------------------------|-------|-----------|---------------|
| Bridgewater . . . | S. Leonard | - | 14,742 | - |
| Berkley | I. N. Babbitt & Co. | 275 | 105,940 | - |
| “ | E. Hathaway | 326 | 130,762 | 144 |
| “ | Nichols & Shove | 360 | 190,000 | - |
| Dighton | Noah Chase | 222 | 65,850 | - |
| “ | Charles N. Simmons | 480 | 156,000 | - |
| Middleborough . . . | J. Garland | - | 166,328 | - |
| Raynham | R. W. Rounsville | 398 | 91,203 | - |
| “ | G. B. & E. Williams | 538 | 272,149 | - |
| Taunton | J. W. Hart | 269 | 81,965 | - |
| | | 2,868 | 1,274,939 | 144 |

TABLE NO. VII. — *Other Fresh-water Seines, or Dip-net Fisheries.*

| TOWNS. | NAME. | Shad. | Alewives. | Striped Bass. | Trout. |
|-----------------------------|---------------------------------|-------|-----------|---------------|--------|
| Weymouth | Weymouth Iron Company | - | 122,625 | - | - |
| Kingston | Cobb & Drew | - | 23,140 | - | - |
| Rochester and Mattapoissett | N. Hammond | - | 391,452 | - | - |
| Barnstable | J. J. Backus | - | 17,471 | - | - |
| Brewster | Charles E. Hall | - | 63,914 | - | - |
| Wellfleet | B. S. Young | - | 27,243 | - | - |
| Eastham | J. Fulcher | - | 5,450 | - | - |
| Harwich | Nathan Doane | - | 774,250 | - | - |
| Marshpee | M. Amos | - | 4,425 | - | 15 |
| “ | George R. Coombs | - | 1,350 | - | 10 |
| “ | Watson F. Hammond | - | 14,275 | - | - |
| “ | W. R. Mingo | - | 10,950 | - | - |
| “ | George T. Oakley | - | 4,250 | - | - |
| “ | W. H. Simon | - | 1,700 | - | - |
| Falmouth | C. E. Winch | - | 23,500 | - | - |
| Warcham | William T. Cobb | - | 379,000 | - | - |
| Marion | Charles A. Hammond | - | 5,900 | - | - |

TABLE No. VII. — *Other Fresh - Water Seines, etc.* — Concluded.

| TOWNS. | NAME. | Shad. | Alewives. | Striped Bass. | Trout. |
|---------------------|---------------------------|-------|-----------|---------------|--------|
| Marion | M. B. Marble | - | 8,678 | 27 | - |
| " | George B. Nye | - | 8,510 | 10 | - |
| Westport | J. G. Remington | - | 20,000 | - | - |
| " | L. D. Tripp | 4 | 1,317 | - | - |
| " | P. S. Tripp | - | 1,582 | 1 | - |
| " | L. W. White | - | 243 | 6 | - |
| Yarmouth | D. S. Baker | - | 25,445 | - | - |
| Dennis | Baker & Wixon | 57 | 2,482 | - | - |
| Tisbury | G. Rodgers & Co. | - | 9,493 | 101 | - |
| Edgartown | David Fisher | - | - | 474 | - |
| " | W. W. Huxford | - | 3,278 | - | - |
| | | 61 | 1,951,923 | 619 | 25 |

TABLE No. VIII. — *Seine Fishery at Mouth of the Merrimac.*

| NAME. | Sea-Herring. | Bluefish. | Menhaden. | Flounders. | Eels. | Striped Bass. |
|--------------------------------|--------------|-----------|-----------|------------|-------|---------------|
| J. A. Emery | - | - | 31,800 | - | - | - |
| E. F. Hunt | 66 | 57 | 40,200 | 225 | 50 | - |
| J. Janvrin | - | 280 | 28,238 | - | - | - |
| N. Lattime | 3,700 | - | 17,950 | - | - | - |
| W. H. H. Perkins & Co. | - | - | 97,050 | - | - | - |
| E. Thurlow | 55,875 | 60 | 257,850 | - | - | 4 |
| | 59,641 | 397 | 473,088 | 225 | 50 | 4 |

FOURTEENTH ANNUAL REPORT

OF THE

COMMISSIONERS

ON

INLAND FISHERIES,

FOR THE

YEAR ENDING SEPTEMBER 30, 1879.

-

BOSTON:

Band, Aberg, & Co., Printers to the Commonwealth,

117 FRANKLIN STREET.

1880.

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Commonwealth of Massachusetts.

To His Excellency the Governor and the Honorable Council.

THE Commissioners on Inland Fisheries beg leave to present their Fourteenth Annual Report.

FISHWAYS.

The large fishway built at East Taunton, over what is generally known as Squaw Betty Dam, has, so far as we can learn, given general satisfaction. Mr. Charles Robinson, who watched it daily during the run of fish, says that every kind of fish belonging to the river were seen in the fishway, — the alewives in great numbers. At the time we visited it, it was crowded with these fish. A few shad were seen in the pass, and some were reported to have been caught above the dam. Both the fishermen and the mill-owners appear to be satisfied with what has been done; and the conflict between them, which has existed more or less for half a century, has, in all probability, been settled. It was, however, not to be expected that men whose heads had grown gray in these battles should suddenly convert their weapons into ploughshares; and it was soon apparent that the conflict had been transferred from Squaw Betty to Middleborough, and the attack directed mainly against the dam at the shovel-works, with occasionally a stray shot at the Star Mills.

At the first-mentioned dam is an old Foster fishway, somewhat poorly altered to the form now generally used in this State. The testimony, in regard to fish passing over it, was conflicting; but an examination, during the run of alewives, showed that a large portion of them did pass up into the lake, and, if the water was properly regulated, there was no serious objection to the fishway.

A portion of the fish have undoubtedly been bred below, and have no disposition to go above.

The present structure, together with the dam, is fast going to decay; and, if it is not speedily attended to, in a short time no fishway will be needed.

The mill is not occupied, and it is not an easy matter to find who owns the property, or who are the responsible parties. When this is settled, either the owners must put in a new fishway similar to the one at Squaw Betty, or give the fish the natural bed of the river.

Westfield River.

At the third dam on Westfield River, owned by the Agawam Canal Company, the gates were hoisted, but the water came through with so much force that the fish could not pass up.

Some change will be made here the coming season.

Fishways will be required at Easton, and over the upper dams on the Westfield River, and also several minor passes for alewives.

Lawrence.

It has been thought best to keep a careful record of what has been seen passing the fishway over this high dam.

Below will be found Mr. Holmes's report of two inspections each day, during the running season.

FISH SEEN IN THE LAWRENCE FISHWAY IN THE YEAR 1879.

- May 5. Water let into the fishway; the river is very high; water very turbid.
9. Saw the first fish, two suckers and one brook trout.
 11. One sucker in fishway.
 12. Alewives and suckers, run moderate; a few chubs and two lamper eels.
 13. Alewives and suckers, run moderate; a few chubs and three lamper eels.
 14. Alewives and suckers, run moderate; a few chubs and one lamper eel.
 15. Alewives and suckers, run moderate, and two lamper eels.
 16. Alewives and suckers, run moderate; one lamper eel.
 17. A few suckers; water has risen in river.
 18. A few suckers; river high and turbid.
 19. A few alewives, one lamper eel.
 20. A few suckers.

- May 21. One sucker.
 22. A few suckers.
 23. A few alewives.
 24. A few chubs and suckers.
 25. A few alewives, suckers, and chubs.
 26. Alewives and suckers, run large; a few chubs and lamper eels.
 27. A few suckers and chubs.
 28. A few lamper eels and silver eels.
 29. A few suckers and chubs.
 30. A few suckers, lamper eels, and silver eels.
 31. A few suckers and chubs.
- June 1. A few suckers, chubs, and lamper eels.
 2. Alewives and suckers, run very large; a few lamper eels, and *three salmon*, 10 to 12 lbs.
 3. Alewives, suckers, chubs, and lamper eels, run excessively large; *one salmon*, 12 lbs.
 4. Alewives, suckers, chubs, and lamper eels, run excessively large; *one salmon*, 9 lbs.
 5. Alewives, suckers, chubs, and lamper eels, run excessively large; *one salmon*, 7 lbs., one shad, and one black bass, 1½ lbs.
 6. Alewives and suckers, run very large; a few chubs and one black bass.
 7. Alewives, run moderate; a few suckers, chubs, and lamper eels.
 8. Alewives, run moderate; a few suckers, chubs, and lamper eels, two black bass.
 9. Alewives, run moderate; a few suckers and lamper eels.
 10. Alewives, run moderate; a few suckers, chubs, lamper eels, and silver eels, *one salmon*, 8 lbs.
 11. At 9 A.M., *one salmon*, 8 lbs.; at 11 A.M., *three salmon*, 10 to 16 lbs., one black bass; alewives, suckers, lamper eels, and small silver eels, run small.
 12. Alewives, suckers, chubs, and lamper eels, run small; one black bass, *one salmon*, 16 lbs.
 13. Alewives, suckers, chubs, and lamper eels, run small; *four salmon*, 8 to 12 lbs.
 14. Alewives, suckers, chubs, and lamper eels, run small; two black bass, *three salmon*, 10 to 18 lbs.
 15. A few alewives, suckers, chubs, and lamper eels, one black bass, *two salmon*, 10 to 14 lbs.
 16. A few alewives, suckers, and lamper eels, *three salmon*, 10 to 14 lbs.
 17. Alewives, run small; a few lamper eels and small silver eels.
 18. A few alewives, suckers, chubs, and lamper eels, one black bass.
 19. A few alewives, suckers, lamper eels, and small silver eels.
 20. A few alewives, suckers, and small silver eels.
 21. A few alewives, suckers, and chubs, one small shad

- June 22. Alewives, run small; a few suckers, chubs, and small silver eels, one small shad.
23. A few alewives, suckers, chubs, lamper eels, and small silver eels, one black bass.
24. A few alewives, suckers, chubs, and small silver eels.
25. A few suckers and chubs, *one salmon*, 15 lbs.
26. Small silver eels, run moderate; a few chubs and suckers, three black bass.
27. Small silver eels, run moderate; a few suckers and chubs.
28. Small silver eels, run moderate; *one salmon*, 14 lbs.
29. Small silver eels, run large; schools of small suckers and chubs.
30. Small silver eels, run large; a few suckers, *one salmon*, 8 lbs.
- July 1. Small silver eels, run moderate; schools of small chubs and a few suckers.
2. Small silver eels, run moderate; schools of small suckers and chubs.
3. Small silver eels, run moderate.
4. Small silver eels, run small; two black bass, two roach (small), two shiners, and a few suckers and chubs.
5. Small silver eels, run moderate; a few suckers and chubs, and two small hornpouts.
6. Small silver eels, run moderate; a few suckers and chubs, two small hornpouts, two shiners.
7. Small silver eels, run moderate; a few suckers and chubs.
8. Small silver eels, run moderate; a few suckers, chubs, and roach, two black bass.
9. Small silver eels, run moderate; a few suckers and chubs.
10. Small silver eels, run moderate; a few suckers and chubs.
11. Small silver eels, run moderate; a few suckers and chubs.
12. Small silver eels, run moderate; a few suckers and chubs, two black bass.
13. Small silver eels, run moderate; a few suckers, chubs, and roach.
14. Small silver eels, run moderate; a few suckers and chubs.
15. Small silver eels, run moderate; a few suckers and chubs.
16. Small silver eels, run moderate; a few suckers and chubs.
17. Small silver eels, run moderate; a few suckers, chubs, and roach.
18. Small silver eels, run moderate; a few suckers and chubs.
19. Small silver eels, run moderate; a few suckers and chubs.
20. Small silver eels, run large; a few suckers and chubs.
21. Small silver eels, run large; a few suckers and chubs.
22. Low water; water shut out of fishway.
26. Let water into fishway; drew down in P.M.; a few suckers, chubs, and small silver eels in it.
27. A few suckers, chubs, and small silver eels.
28. A few suckers, chubs, roach, and hornpouts, one black bass, two red perch, and one shiner.

- July 29. Small silver eels, run moderate; a few suckers, chubs, and roach.
30. Small silver eels, run moderate; a few suckers, chubs, and roach.
31. Small silver eels, run moderate; a few suckers and chubs.
From Aug. 1 to Aug. 26 did not see any thing in the fishway but small silver eels (a hundred or so at a time), and a few suckers, chubs, roach, and shiners (water being shut out of fishway from Aug. 6 to 16, on account of low river).
- Aug. 27. *One salmon, 16 lbs.*; nothing but small silver eels and a few suckers and chubs the rest of the month, excepting the 31st.
31. Two black bass.
From Sept. 1 to Oct. 3, did not see any thing in the fishway but small silver eels and a few suckers and chubs, with now and then a roach or shiner.
- Oct. 3. *One salmon, 6 lbs.*
The water was shut out of the fishway Oct. 9, on account of low water, and was not let in except on Sundays during the whole month. Did not see any fish of any account. Think this has been the most unfavorable October we have had since the fishway has been in operation, the water being very low the whole month.
- Nov. 1. Nothing in the fishway.

Yours respectfully,

THOMAS S. HOLMES.

Palmer's River.

A petition has been received from the selectmen of Rehoboth, complaining of the unlawful and destructive fishing on Palmer's River, that part of it running through Rhode Island, by which the people of this State are said to be deprived of their share of the fish. The river abounds in shad, and if properly controlled by the two States would yield a large amount of spawn for stocking rivers and streams without subjecting the States to the exorbitant charges made by the owners of seining-grounds on the Connecticut and Merrimack.

Connecticut River.

Serious depredations were committed on the fishway at South Hadley during the past season. Thousands of fish were taken from it, and it was found necessary to employ a superintendent to look after what little interest we have left in the river.

It is to the credit of Connecticut, that she has passed a

law shortening the time for taking shad. Such a law, if enforced, will do much toward preventing the total destruction of these fish.

But for the salmon, they are all, or nearly all, killed out of the river by the fishermen. It is true that the Legislature last year passed a law prohibiting the taking of these fish for three years; but every one at all conversant with these matters knows that so long as the gill-nets are allowed to patrol the river, all such laws are worthless. No man can save the salmon after they are gilled in these nets. Nor is there likely to be any conviction for the offence, because these men are fishing for shad, and it is not their fault that the salmon are gilled: they cannot help it; neither could they, were they so disposed, return them alive to the river. It is not probable, under these circumstances, that any court would find them guilty.

Aside from this, should the Commissioners think best to re-stock the river and next season turn young salmon into it, before they would have time to mature and return to deposit their spawn, the law would have expired, and the same destruction by Connecticut fishermen, which occurred in 1878, might be repeated. Our evidence goes to show that few or none of these fish have reached this State. What have been taken in the lower part of the river are known only to the fishermen.

There appears to be very little encouragement for Massachusetts to co-operate with Connecticut in re-stocking the river with salmon.

The effort to obtain shad-spawn at South Hadley was rendered abortive by the exorbitant price insisted upon by the owners of the seining-grounds at that place. The Commissioners of Massachusetts and Connecticut felt justified, even at the loss of the spawn, in resisting all such excessive demands. If the facts could have been known earlier, a place might have been obtained where the shad could be pounded and kept till the spawn was ripe, and where the owner had sufficient foresight to see the advantage he would derive from establishing the breeding-grounds lower down the river. Such an arrangement could probably be carried out at small expense. Two years' seining and pounding would perhaps be all that would be required to establish

new breeding-grounds, and would relieve the United States Commissioner, as well as the Commissioners of the two States, from dependence on a monopoly.

As the cultivation and rearing of trout more strictly comes within the scope of private enterprise, it has been thought best not to devote any more time or expense in that direction than was necessary to furnish the desired information in regard to it. At the time the lease was obtained of the grounds and ponds for the works at Plymouth, N.H., we were obliged to take with them some three hundred trout, with the provision that the same number should be returned at the expiration of the lease. These, with what have since been taken when fishing for salmon, furnish quite a number of breeding fish, from which we have taken this year something over one hundred thousand spawn, one-half of which belongs to Massachusetts. The State has been to no additional expense in procuring these eggs, and it may be desirable to furnish a part of the young fish to persons having control of streams, on condition that they will keep a record, and furnish statistics in regard to them.

There are other waters still open to the public, to which private parties would be willing to bear the expense of transportation, for the sake of having streams re-stocked.

These young trout will be ready to deliver at the hatching-house at Winchester in April next.

LAND-LOCKED SALMON (*Salmo Sebago*).

From the works situated on Grand Lake Stream in Maine, and carried on jointly in the interest of the United States Commission and several of the New England States, under the superintendence of Charles G. Atkins, Massachusetts received as her share 240,000 eggs, from which were hatched 224,763. These young salmon were remarkably fine, and were delivered without loss to various parts of the State, as follows:—

| | |
|---|--------|
| J. D. Whitney, for pond in Harvard . . . | 6,000 |
| W. H. Walker, for pond in East Brookfield . . . | 10,000 |
| E. S. Merrill, for pond in Winchendon . . . | 4,000 |
| W. B. Bigelow, for pond in Natick . . . | 3,000 |
| G. L. Estey, for pond in Milton . . . | 6,000 |
| Henry Hobbs, for pond in Wenham . . . | 10,000 |
| Fred. W. Clapp, for pond in Framingham . . . | 8,000 |

| | |
|--|--------|
| Charles T. Jenkins, for pond in Lynnfield . . . | 8,000 |
| W. R. Adams, for pond in Ashburnham . . . | 20,000 |
| A. Jewett, for pond in Hubbardston . . . | 10,000 |
| W. H. Walker, for pond in East Brookfield . . . | 8,000 |
| Daniel Wetherbee, for pond in Acton . . . | 9,000 |
| O. Stowell, for pond in Wakefield . . . | 3,000 |
| S. H. Sylvester, for pond in Middleborough . . . | 20,000 |
| A. L. Hubbel, for pond in Great Barrington . . . | 6,000 |
| W. E. Gavit, for pond in Stockbridge . . . | 20,000 |
| W. H. King, for pond in Mendon . . . | 3,000 |
| J. H. Curtis, for pond in West Scituate . . . | 3,000 |
| A. E. Maynard, for pond in Paxton . . . | 6,000 |
| Reuben Noble, for pond in Westfield . . . | 20,000 |
| G. H. Weld, for pond in Rochester . . . | 4,000 |
| G. O. Brigham, for pond in Westborough . . . | 4,000 |
| D. W. Bartlett, for pond in Essex . . . | 10,000 |
| H. C. Ewing, for pond in Holyoke . . . | 6,000 |
| R. E. Foster, for pond in Milford . . . | 3,000 |
| T. H. Lawrence, for pond in Falmouth . . . | 3,000 |
| T. H. Tindel, for pond in Marshpee . . . | 6,000 |
| H. E. Priest, for pond in Waltham . . . | 2,000* |

The returns from most of those who received these fish are sufficiently encouraging to warrant a further distribution of them on the following conditions:—

All parties ordering land-locked salmon must make application in writing, giving a careful description of the pond in which they desire to place them.

The plan is to furnish them at the State hatching-house in Winchester, free of charge, to all applicants having under their control any of the great ponds of the State. For transportation, parties should bring with them good clean half-barrels or milk-cans, holding ten or twelve gallons, a thermometer, and a dipper for aerating the water. The half-barrels will carry from 4,000 to 5,000, and the milk-cans about 3,000.

The introduction of these fish into ponds having neither inlet nor outlet will for the present be discontinued.

There will probably be about 200,000 for distribution next spring. No orders will be received after the 20th of April.

None of the spawn of the California salmon, although freely offered by the United States Commissioner to the States, has been accepted by any of the New England Commissioners this year.

There seems to have been a general feeling, without preconcerted action, that it was best not to incur any further expense in trying to introduce them in our waters until something more was known about them. The oft-repeated assertion that these fish all die after spawning has been pretty thoroughly exploded.¹ But although rapid in their growth, and apparently very healthy, they have, from some unknown cause, failed to report themselves. Of the hundreds of thousands that have been put into our rivers, not one adult fish has been seen or taken, and, so far as we know, not a single smolt has been caught in any of our streams. It is to be hoped that the cause of this apparent failure will be discovered, and that the energetic and praiseworthy efforts of the United States Commissioner to introduce them into Eastern waters will yet be successful.

There was an increased run of salmon in the Merrimack the past season over that of the preceding one.² They came in schools during the month of June; but *very* few made their appearance after that month. During the greater part of June there was scarcely a day that they were not seen either in the fishway or around the mouth of it.

Another noticeable fact was that some of the fish were unusually large for this river: one which passed the nets at Plymouth during a heavy rise of water was killed in attempting to scale Livermore Falls. It weighed over 23 pounds. Doubtless it was of the first year's plant.

The season has been an unfortunate one for securing these fish for breeding purposes. Either the water would be so high that the nets could not be maintained, or so low that the salmon were deterred from making any effort to reach their breeding-grounds. A few hours' rain in the mountains will raise the river at Plymouth very rapidly from four to six feet. During the low stage of water many salmon could be seen in deep pools below Plymouth. At New Hampton, late in the season, no less than eight large ones were seen in one

¹ Notwithstanding the very able and exhaustive article by B. B. Redding, Commissioner of California, and the testimony of some forty or fifty fishermen before the Legislature of California, all adverse to his statement, Mr. Stone still clings to the idea that the salmon of the McCloud River die after spawning.

² See report of the Lawrence fishway, above. In 1877, 47 salmon were noted in this pass; in 1878, 17; and in 1879, 29.

pool. The drought has been severe this fall, and it is probable that many salmon have spawned in the rapids below Livermore Falls, instead of going above, as they otherwise would have done. The unfortunate error of closing the fishway at Manchester, at a time when there were many fish below, will, we trust, not be repeated.

The exact number of young salmon deposited alive in the river in 1875 is not known. They were intrusted to the care of Mr. Wadleigh, then Commissioner for New Hampshire, whose inexperience caused considerable loss; and in one instance the fish were disposed of in a direction not contemplated by the Commissioners of this State. These things have had their effect in lessening the number of adult fish taken at the hatching-house. The planting of 1876, under the care of John McNeil, was by far the largest and probably the most successful effort that has been made in any one year toward re-stocking the river. The result of this planting will be due the coming season.

Undoubtedly some plan will be devised to lessen the number of fish that escape the nets at high water; but it is not likely that the entire run of salmon could be stopped at the hatching-house without going to a considerable expense. But it is only while the run is comparatively small that this evil will be felt.

A good many salmon have been taken along the coast in pounds, weirs, and gill-nets. One man near Newburyport took twelve, and many were taken near New Bedford, and sold in that market. Yet, of all the statements received from the fishermen giving the number of edible fish taken by them, only two report any salmon.

There were many parrs and smolts found in the Pemigewasset the past summer, which must have come from spawn naturally deposited by the salmon that reached the headwaters during the last two years.

Below will be found the report of Mr. A. H. Powers, Commissioner of New Hampshire, and superintendent of the hatching-house, in the joint interest of the two States.

To E. A. BRACKETT, Commissioner of Inland Fisheries for the Commonwealth of Massachusetts.

The 367,500 California salmon mentioned in my report one year ago were distributed in the month of January as follows: 25,000 were put in

the Contoocook River, 28,000 in the Salmon Falls River, and the remainder in the Pemigewasset. At any time till the last of August these salmon (parrs) could be seen in large numbers, anywhere in the river near the hatching-house, from three to five inches long, very lively, and apparently healthy.

Some improvements have been made in the storage-pond in the way of excavations, making it larger and certain parts of it deeper.

A tank, seven by twenty feet, has also been placed at the inlet of the four-inch flow-pipe, covered on the bottom with gravel six inches deep, for the double purpose of receiving the salmon when first taken from the river, and attracting them there when ready to spawn. It worked admirably for both purposes. The river-water constantly running into this tank kept the temperature very nearly the same as that of the river, so the fish were allowed to rest before being placed in the cold pond-water; and during the night they could, if they chose, go back and forth from the river-water to the pond-water, and thus the sudden change of temperature was avoided. This, with the improvement in carrying them from the pound to the pond, has prevented the growth of fungus, and they have been perfectly healthy at all times.

From our breeding trout, one hundred and sixty thousand eggs have been taken.

Twenty-two Atlantic salmon have been taken this season, weighing from eight to twenty pounds each. The first was caught June 13, and the last Oct. 29. All were caught at night, or before 6.30 A.M. Thirteen were females, and from them we have secured over a hundred thousand eggs, at the following dates: Oct. 10, the spawn of one female was taken; Oct. 24, two; Oct. 26, one; Oct. 29, two; and the remaining females were treated on the 1st of November.

For over thirty years not a salmon passed up the Pemigewasset.

This is the first time, in this country, at least, that any considerable quantity of eggs has been taken from mature salmon caught from a depleted river artificially re-stocked. The result cannot fail to be highly gratifying to those who have, or have had, the matter in charge; and has, to a certainty, demonstrated that the faith of the few, who argued that the rivers could be re-stocked to advantage, was well founded. Those who have believed it impossible must now be convinced that it is not only possible, but quite practicable.

A. H. POWERS.

PLYMOUTH, N.H.

That the California salmon, put into this river in 1878, survived the winter and summer up to the last of August, making a much more rapid growth than the Atlantic salmon, is certain; but whether they will be found next summer as smolts, or whether their sudden departure last summer was final, remains to be seen. Of the large number that have been turned into the Merrimack during the last five years, this

is the only instance in which any trace of them has been detected so late in the season.

The Bucksport establishment for taking Penobscot salmon spawn was re-opened this season; and the money heretofore used to pay for the transportation and expenses of California salmon was used to secure spawn from this place.

The hundred thousand eggs taken at Plymouth, with what may be obtained from Bucksport, together with the natural deposit in the river, will make a fair planting for the coming season.

The State of New Hampshire has passed a law extending the time for taking salmon to 1882, in order to carry out what has been so successfully begun: a similar law should be passed by Massachusetts.

The extent to which fish-culture is being carried, not only in this country, but all over the civilized world, is having its effect upon the more intelligent class, and the popular element is no longer arrayed against it. The mill-owners, who above all others were supposed to have the best reason for opposing it, have in this State borne themselves in most instances with commendable good taste, and in some instances with great liberality. The most serious opposition, and the most difficult to control, comes from the fishermen. Impatient of restraint, and seeing only the wants of to-day, all regulations for the protection of the whole are apt to be construed into an attack upon their individual rights.¹ Yet no class of men are more likely to be benefited by the effort now being made to stock our inland waters with migratory fish, than the fishermen along our coast. Upon this, more than any thing else, depends their success. If these men would form associations for discussing and obtaining information in regard to the movements and habits of fish, thereby acquiring a knowledge beyond the mere skill in catching them, a very different state of feeling would soon grow up among them. The day has gone by when it could be, "every fisherman for himself, and the Devil take the hindmost."

The tendency of the age is for combinations for mutual

¹ During the past season, Mr. Jonathan Morrill of Amesbury was arrested for illegal fishing. Mr. Morrill is, we regret to say, an old offender, setting a bad example to his brother fishermen. The court promptly fined him, and confiscated his boat and seine.

improvement and protection. There is scarcely a department of industry that has not a union for that purpose ; and, when backed by intelligent action, such associations are of the greatest importance, giving to each department a force that it otherwise could not have. There is every reason why the fisherman, like the farmer, should understand every thing pertaining to his business. The farmer who simply knew how to gather his crops would in all probability find them growing uncomfortably less. To be successful, he must know the nature of the crops, the kind of soil best adapted to them, and the time and manner of planting and cultivating. Even then, if his fences are down, and man and beast are allowed promiscuously to take of the products of his intelligence and labor, he would find little encouragement for continuing his work. Not only must his fences be kept up, but the State must protect him from depredations.

The intelligent fisherman, who wisely looks after his business, will see much in common with the farmer. He will readily see that it is important for him to understand the nature and habits of fish, their times of spawning, and the best way of increasing their numbers, and to insist upon wise legislation for their protection.

No department of industry can be made to develop its best results without the exercise of that intelligence which readily takes advantage of all the elements which lead to success.

THEODORE LYMAN,
E. A. BRACKETT,
ASA FRENCH,

Commissioners on Inland Fisheries.

EXPENDITURES OF THE COMMISSION.

| | |
|-------------------------------|------------------|
| Salary | \$1,500 00 |
| Travelling expenses | 152 99 |
| | <hr/> \$1,652 99 |

CONTINGENT EXPENSES.

| | |
|--|------------------|
| Subscription to fund of Schoodic salmon-breeding establishment | \$500 00 |
| Robert R. Holmes, services | \$172 00 |
| Travelling and other expenses | 57 20 |
| | <hr/> 229 20 |
| Subscription to Penobscot Salmon-breeding Co. | 300 00 |
| A. H. Powers, supt. Plymouth hatchery, services, | 300 00 |
| James U. Hunt, services and expenses | 82 05 |
| H. C. Johnson, services | 51 00 |
| Printing | 56 28 |
| Repairs to hatching-house | 91 00 |
| Rent of land | 50 00 |
| One-half rent of house and land at Plymouth | 50 00 |
| Sundry labor | 107 75 |
| Clerical services | 18 25 |
| Expressage | 37 95 |
| Fishing-privilege, Merrimack River | 30 00 |
| Sign and painting | 15 60 |
| Fish-pails, rubber boots, &c. | 10 50 |
| Lumber | 32 31 |
| | <hr/> \$1,961 89 |
| | <hr/> \$3,614 88 |

APPENDIX.

[A.]

COMMISSIONERS ON FISHERIES.

UNITED STATES.

Professor SPENCER F. BAIRD Washington, D.C.

ALABAMA.

CHARLES S. G. DOSTER Prattville.

CALIFORNIA.

S. R. THROCKMORTON San Francisco.

B. B. REDDING San Francisco.

J. D. FARWELL Alameda.

COLORADO.

W. E. SISTEY Brookvale.

CONNECTICUT.

W. M. HUDSON Hartford.

ROBERT G. PIKE Middletown.

JAMES A. BILL Lyme.

GEORGIA.

THOMAS P. JANES (commissioner of agriculture }
and *ex-officio* commissioner of fisheries) . . } Atlanta.

ILLINOIS.

N. K. FAIRBANK Chicago.

S. P. BARTLETT Quincy.

J. SMITH BRIGGS Kankakee.

IOWA.

B. F. SHAW Anamosa.

KANSAS.

D. B. LONG Ellsworth.

KENTUCKY.

| | |
|---|----------------|
| WILLIAM GRIFFITH, pres., 166 West Main Street | Louisville. |
| JOHN B. WALKER | Madisonville. |
| HON. C. J. WALTON | Munfordsville. |
| HON. JOHN A. STEELE | Versailles. |
| HON. J. H. BRUCE | Lancaster. |
| P. H. DARBY | Princeton. |
| Dr. S. W. COOMBS | Bowling Green. |
| HON. JAMES B. CASEY | Covington. |
| Gen. T. T. GARRARD | Manchester. |
| HON. W. C. ALLEN | Owingsville. |

MAINE.

| | |
|--------------------------|-----------|
| E. M. STILWELL | Bangor. |
| EVERETT SMITH | Portland. |

MARYLAND.

| | |
|---------------------------|------------|
| T. B. FERGUSON | Baltimore. |
| THOMAS HUGHLETT | Easton. |

MASSACHUSETTS.

| | |
|--------------------------|-------------|
| THEODORE LYMAN | Brookline. |
| E. A. BRACKETT | Winchester. |
| ASA FRENCH | Boston. |

MICHIGAN.

| | |
|----------------------------|---------------|
| ELI R. MILLER | Richland. |
| A. J. KELLOGG | Detroit. |
| Dr. J. C. PARKER | Grand Rapids. |

MINNESOTA.

| | |
|---|--------------|
| First District, DANIEL CAMERON | La Crescent. |
| Second District, WILLIAM W. SWENEY, M.D. | Red Wing. |
| Third District, R. OMSBY SWENEY, chairman | St. Paul. |

MISSOURI.

| | |
|--|-------------|
| I. G. W. STEEDMAN, chairman, No. 2,803 Pine St., | St. Louis. |
| JOHN REID | Lexington. |
| SILAS WOODSON | St. Joseph. |

NEVADA.

| | |
|------------------------|--------------|
| H. G. PARKER | Carson City. |
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NEW HAMPSHIRE.

| | |
|----------------------------|---------------|
| SAMUEL WEBER | Manchester. |
| LUTHER HAYES | South Milton. |
| ALBINA H. POWERS | Plymouth. |

NEW JERSEY.

| | |
|-------------------------------|-----------|
| Dr. B. P. HOWELL | Woodbury. |
| Col. E. J. ANDERSON | Trenton. |
| THEODORE MORFORD | Newton. |

NEW YORK.

| | |
|---|---------------|
| R. BARNWELL ROOSEVELT, 76 Chambers Street | New York. |
| EDWARD M. SMITH | Rochester. |
| RICHARD U. SHERMAN | New Hartford. |
| EUGENE G. BLACKFORD, 809 Bedford Avenue | Brooklyn. |

NORTH CAROLINA.

| | |
|---|-------------|
| L. L. POLK (commissioner of agriculture) | Raleigh. |
| S. W. WORTH (superintendent of fisheries) | Morgantown. |

NEBRASKA.

| | |
|-------------------------------|--------------|
| ROBT. R. LIVINGSTON | Plattsmouth. |
| H. S. KALEY | Red Cloud. |
| W. L. MAY | Fremont. |

OHIO.

| | |
|-----------------------------------|-------------|
| J. C. FISHER, president | Coshocton. |
| R. CUMMINGS, treasurer | Toledo. |
| L. A. HARRIS, secretary | Cincinnati. |

PENNSYLVANIA.

| | |
|-----------------------------|----------------|
| H. J. REEDER | Easton. |
| BENJAMIN L. HEWIT | Hollidaysburg. |
| JAMES DUFFY | Marietta. |
| JOHN HUMMEL | Selinsgrove. |
| ROBERT DALZEL | Pittsburg. |
| G. M. MILLER | Wilkesbarre. |

RHODE ISLAND.

| | |
|--------------------------|-------------|
| ALFRED A. REED | Providence. |
| JOHN H. BARDEN | Rockland. |
| NEWTON DEXTER | Providence. |

SOUTH CAROLINA.

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| A. P. BUTLER | Hamburg. |
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TENNESSEE.

| | |
|---------------------------|------------|
| W. W. McDOWELL | Memphis. |
| GEORGE F. AKERS | Nashville. |
| W. T. TURLEY | Knoxville. |

UTAH.

| | |
|--|-------------------|
| A. P. Rockwood (absent; information from Prof. J. L. Barfoot, curator Desert Museum) | } Salt Lake City. |
| | |

VERMONT.

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|-----------------|---|---|---|---|---|---|----------|
| M. GOLDSMITH | . | . | . | . | . | . | Rutland. |
| CHARLES BARRETT | . | . | . | . | . | . | Grafton. |

VIRGINIA.

| | | | | | | |
|------------------------|---|---|---|---|---|------------|
| Col. MARSHALL McDONALD | . | . | . | . | . | Lexington. |
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WEST VIRGINIA.

| | | | | | | |
|--------------------|---|---|---|---|---|-----------|
| HENRY B. MILLER | . | . | . | . | . | Wheeling. |
| CHRISTIAN S. WHITE | . | . | . | . | . | Romney. |
| N. M. LOWRY | . | . | . | . | . | Hinton. |

WISCONSIN.

| | | | | | |
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| Gov. WILLIAM E. SMITH, <i>ex-officio</i> | . | . | . | . | Madison. |
| PHILO DUNNING, president | . | . | . | . | Madison. |
| J. V. JONES | . | . | . | . | Oshkosh. |
| C. VALENTINE, secretary and treasurer | . | . | . | . | Janesville. |
| MARK DOUGLAS | . | . | . | . | Melrose. |
| JOHN F. ANTISDEL | . | . | . | . | Milwaukee. |
| CHRISTOPHER HUTCHISON | . | . | . | . | Beetown. |
| H. W. WELSHER, superintendent | . | . | . | . | Madison. |

DOMINION OF CANADA.

| | | | | | | |
|----------------|---|---|---|---|---|---------|
| W. F. WHITCHER | . | . | . | . | . | Ottawa. |
|----------------|---|---|---|---|---|---------|

[B.]

LISTS OF PONDS LEASED

By the Commissioners on Inland Fisheries, under Authority given by Chap. 384, Sect. 9, of the Acts of 1869.¹

1870.

- Feb. 1. Waushakum Pond, in Framingham, to Sturtevant and others, 20 years.
Mar. 1. Tisbury Great Pond, in Tisbury and Chilmark, to Allen Look and others, 10 years.
April 1. Mendon Pond, in Mendon, to Leonard T. Wilson and another 20 years.
Sept. 12. Baptist Lake, in Newton, to J. F. C. Hyde and others, 20 years.
Oct. 15. Archer's Pond, in Wrentham, to William E. George, 15 years.

1871.

- Jan. 10. Nine Mile Pond, in Wilbraham, to B. F. Bowles, 10 years.
30. Little Pond, in Falmouth, to F. H. Dimmick, 10 years.
April —. Spectacle, Triangle, and Peters Ponds, in Sandwich, to G. L. Fessenden and another, 5 years.
17. Long Pond, in Falmouth, to Joshua S. Bowerman and 3 others, 20 years.
May 15. Pratt's Pond, in Upton, to D. W. Batcheller, 20 years.
18. Little Sandy Pond, in Plymouth, to William E. Perkins, 15 years.
Nov. 1. Punkapoag Pond, in Randolph and Canton, to Henry L. Pierce, 20 years.

1872.

- Jan. 1. Sandy Pond, Forest Lake, or Flint's Pond, in Lincoln, to James L. Chapin and others, 20 years.
July 20. Little Pond, in Braintree, to Eben Denton and others, 20 years.

1873.

- May 1. Meeting-house Pond, in Westminster, to inhabitants of Westminster, 15 years.

¹ We would remind lessees of ponds that they are required, by their leases, to use all reasonable efforts to stock their ponds, and keep accurate records of the same, and make returns of their doings to the Commissioners on the *1st of October*, each year, of the number and species of fish which they have put in or removed from their ponds. Any failure to comply with these conditions is a breach of contract invalidating their lease. It is important that the State should know just what is being done; and, where there appears to be mismanagement or apparent failure, the Commissioners will visit the ponds, and ascertain, if possible, the cause.

1873.

- May 1. Great Pond, in Weymouth, to James L. Bates and others, 15 years.
- July 1. Little Sandy Pond, in Pembroke, to A. C. Brigham and others, 16 years.
- Sept. 1. Pontoosuc Lake, in Pittsfield and Lanesborough, to E. H. Kellogg and others, 15 years.
- Oct. 1. Farm Pond, in Sherborn, to inhabitants of Sherborn, 15 years.
1. Spot Pond, in Stoneham, to inhabitants of Stoneham, 15 years.
- Nov. 1. Lake Chaubunagungamong, or Big Pond, in Webster, to inhabitants of Webster, 5 years.
- Dec. 1. Lake Wauban, in Needham, to Hollis Hunnewell, 20 years.

1874.

- Mar. 1. Walden and White Ponds, in Concord, to inhabitants of Concord, 15 years.
2. Upper Nankeag, in Ashburnham, to inhabitants of Ashburnham, 20 years.
- April 1. Elder's Pond, in Lakeville, to inhabitants of Lakeville, 15 years.
20. North and South Podunk Ponds, in Brookfield, to inhabitants of Brookfield, 15 years.
- May 1. Maquan Pond, in Hanson, to the inhabitants of Hanson, 15 years.
2. Brown's Pond, in Peabody, to John L. Shorey, 15 years.
16. Wickaboag Pond, in West Brookfield, to Lemuel Fullam, 15 years.
20. Unchechewalom and Massapog Ponds, to the inhabitants of Lunenburg, 20 years.
- July 1. Hardy's Pond, in Waltham, to H. E. Priest and others, 15 years.
1. Hockomocko Pond, in Westborough, to L. N. Fairbanks and others, 15 years.
11. Mitchell's Pond, in Boxford, to R. M. Cross and others, 15 years.
11. Hazzard's Pond, in Russell, to N. D. Parks and others, 20 years.
- Oct. 1. East Waushacum Pond, in Sterling, to inhabitants of Sterling, 20 years.
20. Middleton Pond, in Middleton, to inhabitants of Middleton, 15 years.

1875.

- Jan. 1. White and Goose Ponds, in Chatham, to George W. Davis, 15 years.
- Mar. 1. Lake Pleasant, in Montague, to inhabitants of Montague, 10 years.
- Mar. 1. Hood's Pond, in Ipswich and Topsfield, to inhabitants of Topsfield, 15 years.

1875.

- April 1. Chauncey Pond, in Westborough, to inhabitants of Westborough, 15 years.
 3. West's Pond, in Bolton, to J. D. Hurlburt and others, 15 years.
 15. Gates Pond, in Berlin, to E. H. Hartshorn and others, 15 years.
 24. Pleasant Pond, in Wenham, to inhabitants of Wenham, 15 years.
- May 1. Morse's Pond, in Needham, to Edmund M. Wood, 15 years.
 1. Great Pond, in North Andover, to Eben Sutton and others, 20 years.
 1. Chilmark Pond, in Chilmark, to J. Nickerson and others, agents, 20 years.
- July 1. Winter Pond and Wedge Pond, in Winchester, to inhabitants of Winchester, 15 years.
 1. Haggett's Pond, in Andover, to inhabitants of Andover, 20 years.
- Aug. 1. Oyster Pond, in Edgartown, to J. H. Smith and others, 20 years.
 7. West Waushacum Pond, in Sterling, to inhabitants of Sterling, 20 years.
 9. Mystic (Upper) Pond, in Winchester, Medford, and Arlington, to inhabitants of Winchester and Medford, 15 years.
- Oct. 1. Little Chauncey and Solomon Ponds, in Northborough, to inhabitants of Northborough, 15 years.

1876.

- Feb. 1. Great Sandy Bottom Pond, in Pembroke, to Israel Thrasher and others, 15 years.
- Mar. 1. Dennis Pond, in Yarmouth, to inhabitants of Yarmouth, 15 years.
 1. Crystal Lake, in Wakefield, to Lyman H. Tasker and others, 15 years.
 20. Lower Naumkeag Pond, in Ashburnham, to inhabitants of Ashburnham, 18 years.
 28. Dennison Lake, in Winchendon, to inhabitants of Winchendon, 15 years.
 28. Phillipston Pond, in Phillipston, to inhabitants of Phillipston, 20 years.
- May 8. South-west Pond, in Athol, to Adin H. Smith and others, 15 years.
- June 1. Norwich Pond, in Huntington, to inhabitants of Huntington, 20 years.
 10. Dug Pond, in Natick, to W. P. Bigelow and others, 15 years.
- Oct. 1. Farm and Learned's Pond, in Framingham, to inhabitants of Framingham, 15 years.
 1. Whitney's Pond, Wrentham, to inhabitants of Wrentham, 15 years.
 1. Little Pond, in Barnstable, to George H. Davis, 15 years.

1877.

- Mar. 1. Nine Mile Pond, in Wilbraham, to inhabitants of Wilbraham, 15 years.
 15. Pentucket and Rock Ponds, in Georgetown, to inhabitants of Georgetown, 15 years.
 Aug. 10. Onota Lake, in Pittsfield, to William H. Murray and others, 15 years.
 Oct. 1. Fort, Great Spectacle, and Little Spectacle Ponds, in Lancaster, to inhabitants of Lancaster, 20 years.
 1. Battacook Pond, in Groton, to George S. Graves and others, 15 years.
 Nov. 1. Tispaquin Pond, in Middleborough, to Abishai Miller, 15 years.
 1. Asnebumskitt Pond, in Paxton, to Ledyard Bill and others, 15 years.

1878.

- Jan. 1. Sniptuit, Long, Snow, and Mary's Ponds, in Rochester, to inhabitants of Rochester, 15 years.
 Mar. 16. Asnaconcomic Pond, in Hubbardston, to Amory Jewett, jun., 15 years.
 April 1. Dorrity Pond, in Millbury, to inhabitants of Millbury, 10 years.
 May 1. Spectacle, Peters, and Triangle Ponds, in Sandwich, to George L. Fessenden, 10 years.
 1. Bear Hill Pond and Hall Pond, in Harvard, to inhabitants of Harvard, 15 years.
 July 1. Lake Buell, in Monterey and New Marlborough, to Andrew L. Hubbell and others, 5 years.
 Oct. 1. Eel Pond, in Melrose, to J. A. Barrett and others, 15 years.
 1. Accord Pond in Hingham, South Scituate, and Rockland, to inhabitants of those towns, 10 years.
 1. Wright's and Ashley's Ponds, in Holyoke, to Henry C. Ewing and others, 10 years.
 1. Magog Pond, in Acton and Middleton, to inhabitants of Acton, 15 years.
 Halfway Pond, in Plymouth, taken by Commissioners for 5 years from March 1, 1878, in accordance with provisions of chap. 62 of the Acts of 1876.

1879.

- Feb. 1. Lake Mahkunac and Lake Overic, in Stockbridge, to inhabitants of Stockbridge, 10 years.
 June 1. "Bald Pate," "Four Mile," and "Stiles" Ponds, in Boxford, to inhabitants of Boxford, 10 years.
 July 1. Silver Lake, in Wilmington, to inhabitants of Wilmington, 10 years.
 1. Fresh Pond, in Falmouth, to Thomas H. Lawrence, 20 years.
 Oct. 1. Pomp's Pond, in Andover, to inhabitants of Andover, 15 years.
 Nov. 1. Lake Quinapowitt, in Wakefield, to inhabitants of Wakefield, 14 years.

[C.]

LEGISLATION. — 1876.

[Omitted in former Report.]

[CHAP. 208.]

AN ACT TO REGULATE THE FISHERIES IN TAUNTON GREAT RIVER
AND NEMASKET RIVER.*Be it enacted, &c., as follows :*

SECTION 1. No shad or alewives shall be taken in any part of Taunton Great River or Nemasket River, between the hours of twelve o'clock in the night following Thursday of each week, and four o'clock on Monday morning succeeding, from the first day of March to the tenth day of June of each year, including both of said days.

Section five of chapter four hundred and one of the acts of the year eighteen hundred and fifty-five, and chapter two hundred and fifty-eight of the acts of the year eighteen hundred and seventy-one, are hereby repealed.

SECT. 2. Not more than one seine shall be cast, set, swept, or used on said rivers, within the same limits or over the same ground and at the same fishing place or location, nor shall any seine be cast, set, swept, or used within forty rods of any other seine. Any person violating this section shall pay a fine of not less than fifty nor more than two hundred dollars; and whoever violates the provisions of the first section shall be liable to the penalties and forfeitures provided in said chapter four hundred and one of the acts of the year eighteen hundred and fifty-five.

SECT. 3. This act shall take effect on the first day of July next.
[Approved April 28, 1876.]

1879.

[CHAP. 45.]

AN ACT TO ESTABLISH AN ALEWIFE FISHERY IN EASTHAM.

Be it enacted, &c., as follows :

SECTION 1. The town of Eastham is hereby authorized to make the necessary improvements for the preservation and taking of alewives in the Great Pond, so called, in the town of Eastham and the waters connected therewith and the outlet therefrom to the sea, and may take land

and do all acts necessary for the purpose of establishing, protecting, and regulating an alewife fishery in said waters.

SECT. 2. The said town of Eastham shall be liable to pay all damages that shall be sustained in any way by any persons in their property, in carrying into effect this act. If any person sustaining damage as aforesaid shall not agree with the selectmen of the town upon the amount of damage to be paid therefor, he may have his damage assessed and paid in the manner provided by law in respect to land taken for highways.

SECT. 3. Any fishery so created shall be deemed to be the property of said town of Eastham; and said town may make any proper regulations concerning the same, and may lease such fishery for a period not exceeding five years, upon such terms as may be agreed upon between said town and the lessees of the same.

SECT. 4. No persons without the permission of said town or of the lessees of said fishery shall take, kill, or haul on shore, any alewives in the fishery so created by the town.

SECT. 5. Whoever violates any of the provisions of this act or any of the regulations of the town regarding said fishery shall forfeit and pay a sum not less than five nor more than fifty dollars for each offence, to be recovered by prosecution before any court in the county of Barnstable competent to try the same. Said forfeiture shall accrue to the benefit of the inhabitants of the town.

SECT. 6. All prosecutions under the preceding section shall be instituted within thirty days from the time the offence was committed.

SECT. 7. This act shall take effect upon its passage. [*Approved February 21, 1879.*]

[CHAP. 65.]

AN ACT TO AMEND CHAPTER FORTY OF THE ACTS OF THE YEAR
EIGHTEEN HUNDRED AND THREE, RELATIVE TO THE PRIVILEGE
OF TAKING CERTAIN FISH IN MYSTIC RIVER IN MEDFORD.

Be it enacted, &c., as follows:

SECTION 1. Section three of chapter forty of the acts of the year eighteen hundred and three is hereby amended by striking out the word "freeholders" in the third line of said section, and inserting in place thereof the word "inhabitants."

SECT. 2. This act shall take effect upon its passage. [*Approved February 27, 1879.*]

[CHAP. 83.]

AN ACT FOR THE BETTER PROTECTION OF THE SHAD AND ALEWIFE
FISHERY IN TAUNTON GREAT RIVER.

Be it enacted, &c., as follows:

Any person who shall wilfully drive or stick any stake in or upon any fishing ground or privilege duly located in Taunton Great River, or who shall, by throwing into the waters thereof any substance or thing, or in

any other manner, prevent, obstruct, or impede any purchaser or purchasers of such ground or privilege or their agents from seining or fishing thereon at such time and manner as provided by law, shall for each offence be punished by a fine not exceeding ten dollars. [*Approved February 28, 1879.*]

[CHAP. 110.]

AN ACT REGULATING THE TAKING OF PERCH IN THE TOWN OF PLYMOUTH.

Be it enacted, &c., as follows:

SECTION 1. Whoever takes or catches any white or red perch, except with naturally or artificially baited hooks and lines, in any of the ponds or streams within the limits of the town of Plymouth, shall for each offence forfeit not less than two nor more than twenty dollars.

SECT. 2. This act shall take effect upon its passage. [*Approved March 12, 1879.*]

[CHAP. 119.]

AN ACT FOR THE PROTECTION OF THE FISHERIES OF MILL RIVER AND ITS TRIBUTARIES IN THE TOWN OF ESSEX.

Be it enacted, &c., as follows:

SECTION 1. The owners and proprietors of dams on Mill River or Brook, in the town of Essex, are hereby required to erect and maintain fishways over or around said dams, and they shall be subject to all the powers given to the commissioners on inland fisheries under the laws of the Commonwealth.

SECT. 2. No person shall take, catch, or cause to be taken or caught by any means whatsoever, in said river or its tributaries, or the ponds and connecting streams out of which said river and tributaries flow, any of the fish called alewives or shad, nor any land-locked salmon in said ponds and connecting streams, until the first day of May in the year eighteen hundred and eighty-four.

SECT. 3. The inhabitants of the town of Essex may make all proper regulations concerning said fisheries in said Mill River and its tributaries, within said town of Essex, provided they do not conflict with the general laws relating to inland fisheries.

SECT. 4. Any person offending against any of the provisions of this act shall forfeit for each offence a sum not less than five nor more than thirty dollars, and shall be subject to all further penalties in such cases, as is by law made and provided. [*Approved March 13, 1879.*]

[CHAP. 127.]

AN ACT TO AMEND CHAPTER EIGHTY-TWO OF THE ACTS OF THE YEAR EIGHTEEN HUNDRED AND SEVENTY-FOUR, "TO PROTECT THE RIGHTS OF OWNERS OF PONDS."

Be it enacted, &c., as follows:

Section one of chapter eighty-two of the acts of the year eighteen hundred and seventy-four is hereby amended by striking out the words "or artificial" in the second line of said section, and by inserting after the word "acres" in the fourth line, the words "or of any artificial pond of any size, in which fishes are lawfully cultivated or maintained." [Approved March 21, 1879.]

[CHAP. 137.]

AN ACT FOR THE BETTER PROTECTION OF THE FISHERY OF THE NINE MILE POND FISHING COMPANY.

Be it enacted, &c., as follows:

SECTION 1. Whoever takes or catches any alewives in Centreville River, so called, in the town of Barnstable, between that part of said river where the mouth of the canal of the Nine Mile Pond Fishing Company opens into the same, and a point fifteen rods above said mouth, shall forfeit and pay a fine of not less than five nor more than fifty dollars for each offence.

SECT. 2. Nothing herein contained shall be construed to authorize the taking of alewives by any person between said mouth of said canal and tide-water.

SECT. 3. This act shall take effect upon its passage. [Approved March 21, 1879.]

[D.]

LETTER FROM WALTER M. BRACKETT, ON THE
CANADIAN SEA-TROUT.

BOSTON, Nov. 26, 1879.

HON. THEODORE LYMAN.

Dear Sir, — During my summer visits to Canada, where I have had ample opportunity of becoming thoroughly acquainted with the habits of the “sea-trout,” it has often occurred to me that their introduction into our rivers would prove a valuable acquisition to our present limited supply of salmonidæ.

The commission have done so much good work, and have been so successful in their labors, that I have no doubt but that, with a little trouble and a small expenditure of money, this valuable fish could be successfully introduced into our rivers.

Although it is still (in the minds of many) a mooted question as to whether they are, or are not, a distinct species of *Salmo*, yet I have no doubt on the subject. Their habits alone are, I think, conclusive evidence. They are clearly and distinctly a migratory fish, making their appearance at the mouths of the rivers as early as the 1st of June, and remaining but a short time, evidently in quest of food. About the 1st of July and up to the middle of August, they crowd up the rivers in myriads on the way to their spawning-grounds. They are a hardy fish, voracious feeders in both salt and fresh water; and as an article of diet unsurpassed by any other of the *Salmo* species. They abound in nearly all the salmon rivers of the Dominion of Canada, and far up on the Labrador coast, but are not usually found in the smaller streams. Like the *Salmo salar*, they invariably return to the rivers in which they are bred.

I hope your commission will consider this proposition, and, if deemed expedient, take measures to accomplish the desired object, in which case I shall be most happy to give you all the aid and comfort in my power.

Yours truly,

WALTER M. BRACKETT.

[E.]

RETURNS OF WEIRS, SEINES, AND GILL-NETS.

The following tables show the returns of 53 weirs, 31 sea-seines, 100 gill-nets; 7 Connecticut River seines; 8 in the Merrimack and 3 at its mouth, and 9 in the Taunton; also 22 fresh-water fisheries by seine or gill-net: of the last, and of those in the Merrimack, several of the more important have failed to make their returns.

On the whole the year has been a bad one from the great falling-off in menhaden and bluefish, as well as of alewives: sea-herring on the contrary, with the less important tautog and flat-fish, have been very abundant.

TABLES.

TABLE NO. I. — POUNDS AND WEIRS. — Showing the Catch of each for 1879.

| TOWN OR PLACE. | PROPRIETOR. | Shad. | Sea-herring. | Striped Bass. | Alewives. | Squeague. | Mackerel. | Spanish Mackerel. | Tautog. | Flounders and Flat-fish. | Scup. | Menhaden. | Bluefish. | Salmon. | Eels. |
|----------------|----------------------------|-------|--------------|---------------|-----------|-----------|-----------|-------------------|---------|--------------------------|-------|-----------|-----------|---------|-------|
| Cohasset | D. L. Wood | 37 | 140,600 | - | - | - | 19,305 | - | - | - | - | 1,980 | - | - | - |
| Barnstable | Benjamin Lovell | 5 | - | 52 | - | - | 105 | - | - | - | - | - | 898 | - | - |
| Brewster | Freeman Atwood | 8 | 9 | 44 | 4,081 | - | 50 | - | 9 | - | - | - | 2,548 | - | - |
| " | Cahoon & Ellis | 43 | - | 18 | 1,490 | - | 13 | - | 223 | - | 1 | - | 10,266 | - | - |
| " | V. B. Newcomb | 117 | - | - | 1,400 | - | 5,010 | - | 102 | - | - | - | 6,357 | - | - |
| " | William C. Parker | 118 | - | 107 | 2,039 | - | 6 | 11 | 4 | - | - | - | 2,994 | - | - |
| East Brewster | Z. H. Rogers | - | 25 | 4 | 400 | - | 75 | - | 13 | - | - | - | 7,140 | - | - |
| Orleans | Isaac Hopkins | 8 | 6 | - | - | - | 1,009 | - | - | - | - | - | 6,693 | - | - |
| " | George S. Nickerson | 55 | 12,000 | 9 | 914 | - | 437 | - | 75 | 80 | - | 74 | 8,536 | - | - |
| " | A. L. Walker | 63 | 24 | 22 | 475 | - | 294 | - | 123 | - | - | 135 | 21,587 | - | - |
| Eastham | W. F. Doane & R. H. Horton | - | - | - | 900 | - | 1,445 | - | - | - | - | - | 11,850 | - | - |
| " | A. H. Higgins | - | - | - | - | - | - | - | - | - | - | - | 4,776 | - | - |
| " | N. M. Knowles | - | - | - | - | - | 153 | - | - | - | - | - | 7,516 | - | - |

| | | | | | | | | | | | | | | | | |
|-----------|---|---|-----------------------------|-------|-----------|-----|--------|-----|---------|---------|---|-----|-------|--------|--------|---------|
| Eastham | . | . | William H. Nickerson . | - | - | - | - | - | - | 80 | 1 | 13 | - | - | - | 9,129 |
| " | . | . | James Savage . | - | - | - | 3,255 | - | - | 16,851 | - | - | 3,492 | - | 1,525 | 4,636 |
| " | . | . | Philip Smith . | - | - | - | - | - | - | 1,830 | - | - | - | - | - | 100,429 |
| Wellfleet | . | . | I. H. Horton . | - | - | - | - | - | - | 3,000 | - | - | - | - | - | 46,700 |
| Truro | . | . | Chas. H. Collins . | 5 | 350 | - | - | - | - | 1,016 | - | - | - | - | - | 665 |
| Chatham | . | . | S. F. Bearse . | 962 | 1,172,605 | 5 | 37,012 | - | - | 152,705 | - | 53 | 9,355 | - | 13,404 | - |
| " | . | . | Levi Eldredge . | 621 | 2,140 | 6 | - | - | - | 4,228 | - | 23 | 79 | - | 1,515 | 421 |
| " | . | . | Frank Lanphear . | 1,083 | 60,000 | - | 20,800 | - | - | 12,715 | - | - | - | - | 72,800 | 198 |
| " | . | . | Reed, Loveland, & Co.. | 3,897 | - | - | 32,150 | - | - | 250,896 | - | - | - | - | 7,900 | - |
| " | . | . | George W. Reynolds . | 1,095 | 83,093 | - | 48,249 | 4 | 79,839 | - | - | 47 | 1,421 | 45 | 24,951 | 18 |
| " | . | . | Village Weir Co. . | 2,007 | 52,970 | 4 | 34,194 | 1 | 170,061 | - | - | - | - | - | 18,100 | 147 |
| Harwich | . | . | J. N. Eldredge . | 11 | 3,480 | 2 | - | 3 | 124 | - | - | 56 | - | 156 | 1,500 | 3,281 |
| " | . | . | W. B. Kelley . | 209 | 6,700 | - | 16,900 | 16 | 163 | - | - | 69 | 186 | 52 | 730 | 30 |
| " | . | . | D. F. Weeks . | 384 | - | 56 | 39,320 | 18 | 1 | - | - | 20 | 6,763 | - | 60,663 | 880 |
| Dennis | . | . | Nobscussett Fish Weir Co. . | 5 | - | 490 | 238 | - | - | - | - | 18 | - | - | - | 5,310 |
| Yarmouth | . | . | D. B. Crocker . | 11 | 16 | 72 | 80 | - | 282 | - | - | - | - | - | - | 3,181 |
| Waquoit | . | . | T. J. Phinney . | 176 | 1,036 | 72 | 58,627 | 80 | 1 | - | - | 173 | 4,403 | 4 | 68,449 | 645 |
| Falmouth | . | . | John Rogers . | - | - | - | - | 158 | - | - | - | 151 | - | 79,791 | 24,000 | 442 |

TABLE No. I. — Concluded.

| TOWN OR PLACE. | PROPRIETOR. | Shad. | Sea-herring. | Striped Bass. | Alewives. | Squeteague. | Mackerel. | Spanish Mackerel. | Tanlog. | Flounders and Flat-fish. | Scup. | Menhaden. | Bluesh. | Salmon. | Eels. |
|-------------------|-----------------------|-------|--------------|---------------|-----------|-------------|-----------|-------------------|---------|--------------------------|---------|-----------|---------|---------|-------|
| Falmouth . . | Woods Holl Weir Co. . | 20 | 20,187 | 1,706 | - | 1,895 | 94 | 3 | 21,716 | 514 | 330,224 | 2,393 | 676 | 1 | - |
| Mattapoisett . . | Bowman & Nye . . | 4 | - | 1 | 25,303 | 127 | - | - | - | - | 3,413 | - | - | - | - |
| " . . | Jerome B. Dunn . . | 1 | - | - | 28,624 | - | - | - | 270 | 214 | 2,722 | 2,850 | - | - | - |
| Fairhaven . . | J. C. & J. J. Allen . | 4 | 1 | 156 | 2,854 | 188 | - | - | - | 523 | 6,297 | 164 | 45 | - | 194 |
| " . . | D. W. Deane . . | 6 | - | 280 | 15,670 | 242 | - | 1 | 5,440 | 2,463 | 5,757 | 3,750 | 305 | - | 854 |
| " . . | " . . | 7 | - | 39 | 4,620 | - | - | - | 495 | 841 | 3,263 | 900 | 22 | - | 4 |
| " . . | George R. Deane . . | 4 | - | 9 | 8,478 | 415 | - | - | 1,271 | 3,179 | 17,667 | 700 | 253 | - | - |
| " . . | S. Dunn & O. Lapham . | 16 | 2 | 79 | 33,016 | 216 | 1 | - | 1,151 | 1,259 | 9,721 | 9,345 | 853 | - | 742 |
| " . . | George L. Hiller . . | 6 | - | 18 | 5,524 | 300 | - | - | 1,074 | 1,460 | 5,889 | - | 229 | - | 17 |
| " . . | Frank P. Paine . . | 3 | 4 | 42 | 7,933 | 28 | - | - | 343 | 736 | 87 | 492 | 21 | - | 76 |
| " . . | C. D. Sherman . . | 36 | - | 6 | 6,340 | 53 | - | - | 2,284 | 70 | 78 | 1,774 | 101 | - | - |
| " . . | O. S. Tilton . . | 9 | 18 | 63 | 7,820 | 138 | - | - | 2,505 | 1,037 | 2,013 | 825 | 184 | - | 244 |
| North Tisbury . . | Jason Luce . . | - | 15,700 | 700 | - | 550 | - | - | 300 | - | 6,000 | 7,500 | - | - | - |
| Tisbury . . | Thomas E. Norton . . | 28 | 221 | 64 | 7,245 | 8 | 1 | - | 28 | 414 | 1,202 | 11 | 3 | - | - |
| " . . | G. Rogers . . | 26 | - | - | 10,664 | 874 | 1 | - | 97 | 1,556 | 1,430 | 1,695 | 108 | - | - |

| | | | | | | | | | | | | | | | | |
|-----------------|---|-------------------------|--------|-----------|-------|---------|--------|---------|----|--------|--------|---------|---------|---------|---|-------|
| Chilmark | . | R. Flanders & A. Smith, | 95 | 19,200 | 88 | 36,287 | 1,142 | - | - | - | 6,803 | 2,957 | 1,782 | 181 | - | - |
| Gay Head | . | P. M. Stuart | 202 | - | 59 | 54,159 | 575 | 244 | - | 90 | 11,845 | 6,389 | 6,251 | 676 | - | - |
| Gosnold | . | Chas. C. Church | 14 | - | 2,211 | 1,050 | 172 | - | - | 283 | 11,800 | 49,500 | 2,700 | 87 | - | - |
| " | . | L. Luce | 4 | - | 204 | 3,875 | 1,200 | - | - | - | 2,177 | 299 | 238 | 116 | - | - |
| " | . | W. G. Rathbun | 8 | - | - | 1,200 | 439 | 16 | - | 245 | 450 | 29,550 | - | 42 | - | - |
| South Dartmouth | . | Manuel Joseph | 21 | - | - | 7,690 | 379 | - | - | 345 | 1,156 | 531 | 7 | - | - | - |
| Dartmouth | . | George A. Snell | 130 | - | - | 32,245 | 2,387 | 7 | - | 409 | 19,750 | 6,450 | 30,900 | 16 | - | - |
| | | Total. | 11,564 | 1,590,387 | 6,668 | 603,121 | 11,608 | 672,058 | 16 | 39,518 | 94,046 | 571,488 | 372,003 | 271,191 | 2 | 2,175 |

TABLE NO. II. — SALT-WATER SEINES. — Showing the Catch of each for 1879.

| TOWN OR PLACE. | PROPRIETOR. | Shad. | Sea-herring. | Striped Bass. | Alewives. | Scup. | Squeteague. | Mackerel. | Tautog. | Flounders and Flat-fish. | Bluefish. | Menhaden. | Eels. | Frost-Fish. | Perch. | Smelts. |
|------------------|-----------------------|-------|--------------|---------------|-----------|-------|-------------|-----------|---------|--------------------------|-----------|-----------|-------|-------------|--------|---------|
| Barnstable . . | W. F. Carney . . | . | . | . | . | . | . | . | . | . | 3,594 | . | . | . | . | . |
| " . . | Sherman & Loring . . | . | . | . | . | 4,081 | 4 | . | 216 | 1,362 | 1,351 | 93 | . | . | . | . |
| " . . | James P. Smith . . | . | . | 143 | . | . | . | . | . | . | 380 | . | . | . | . | . |
| Wellfleet . . | C. Z. Rogers . . | . | . | . | . | . | . | 635 | 8 | . | 2,802 | 21 | . | . | . | . |
| Provincetown . . | Joseph Sears . . | . | 4,010 | . | . | . | . | 1,780 | . | 725 | 595 | . | . | . | . | . |
| Truro . . | Stephen S. Lewis . . | . | . | 2 | . | . | . | . | . | . | 1,380 | . | . | . | . | . |
| Eastham . . | H. L. Knowles . . | . | 12 | . | . | . | . | 1,393 | 9 | . | 5,300 | 2 | . | . | . | . |
| " . . | W. O. Knowles . . | . | . | . | . | . | . | 1,422 | 44 | . | 7,944 | . | . | . | . | . |
| " . . | Lewis Lombard . . | . | . | . | . | . | . | . | . | . | 6,189 | . | . | . | . | . |
| Chatham . . | S. W. Gould & Co. . . | . | . | 16 | . | . | . | 8 | . | 34 | 2,036 | 3,000 | . | . | . | . |
| " . . | Horatio Howes . . | . | . | 385 | . | . | . | . | . | . | 1,534 | . | . | . | . | . |
| Dennis . . | Hiram E. Baker . . | . | 16 | 8 | 4,955 | . | . | . | 1 | 575 | . | . | 272 | . | . | . |
| " . . | Z. H. Baker . . | . | . | . | . | . | . | . | . | . | 4,963 | . | . | . | . | . |
| " . . | Nathan Kelly . . | 1 | . | 2 | 114,877 | . | . | 850 | 23 | 1,700 | 6,358 | . | 5 | . | . | . |
| Westport . . | Samuel G. Allen . . | 2 | . | 6 | 1,061 | . | 1 | . | 1 | . | . | 328 | 14 | . | 1,169 | 463 |

TABLE No. III. — GILL-NETS. — Showing the Catch of each for 1879.

| TOWN OR PLACE. | PROPRIETOR. | Shad. | Alwives. | Sea-herring. | Striped Bass. | Scup. | Squeteague. | Mackerel. | Bluefish. | Tautog. | Flounders and Flat-fish. | Menhaden. | Eels. |
|----------------|--------------------|-------|----------|--------------|---------------|-------|-------------|-----------|-----------|---------|--------------------------|-----------|-------|
| Barnstable | James A. Fish | . | . | . | 133 | 1,176 | - | - | 2,811 | 369 | - | - | - |
| " | David P. Nickerson | . | . | 2 | - | 114 | - | - | 1,048 | 37 | - | 12 | - |
| " | David Rogers | . | . | - | - | - | - | - | 1,614 | - | - | - | - |
| Orleans | Jabez Sparrow | . | . | - | - | - | - | 2,022 | 1,906 | - | - | - | - |
| " | E. S. Young | . | . | - | - | - | - | - | 425 | - | - | - | - |
| Wellfleet | A. W. Harding | . | . | - | - | - | - | 661 | - | - | - | - | - |
| Provincetown | D. H. Atkins | . | . | - | - | - | - | 484 | 2,344 | - | - | - | - |
| " | Henry Atkins | . | . | - | - | - | - | 190 | 243 | - | - | - | - |
| " | J. Atkins | . | . | - | - | - | - | 160 | 803 | - | - | - | - |
| " | N. Atkins | . | . | - | - | - | - | 1,870 | 168 | - | - | - | 1,341 |
| " | D. W. Atwood | . | . | 7,567 | - | - | - | - | 3,083 | - | - | - | - |
| " | P. L. Bangs | . | . | 2,290 | - | - | - | 745 | 237 | - | - | - | - |
| " | F. M. Bowley | . | . | - | - | - | - | 589 | 12 | - | - | - | - |
| " | N. Cook | . | . | - | - | - | - | 430 | 819 | - | - | - | - |
| " | E. Doane | . | . | 2,661 | - | - | - | 85 | 354 | 243 | - | - | - |

| | | | | | | | | | | | | |
|---------------|------------------------------|----|-----|-------|---|---|---|-------|-------|-----|---|---|
| Provincetown. | J. B. Dyer | — | — | 1,600 | — | — | — | 83 | — | — | — | — |
| " | William Dyer | 13 | 388 | 274 | — | 2 | — | 35 | 133 | — | — | — |
| " | E. E. Emery | — | — | 1,560 | — | — | — | 421 | — | 1 | — | — |
| " | H. Freeman | — | — | — | — | — | — | 485 | 1,069 | — | — | — |
| " | J. E. Freeman | — | — | — | — | — | — | 680 | — | — | — | — |
| " | Prince Freeman | 14 | — | 662 | — | — | — | 288 | 998 | — | — | — |
| " | John Ghen | — | — | 150 | — | — | — | 175 | 134 | — | — | — |
| " | J. C. P. Harvender | — | 623 | 8,569 | — | — | — | 1,587 | 17 | — | — | — |
| " | Levi B. Kelly | — | — | 480 | — | — | — | 448 | 97 | — | — | — |
| " | Benjamin Lewis | — | — | — | — | — | — | 1,612 | 1,938 | 300 | — | — |
| " | George Lewis | — | — | — | — | — | — | 800 | 1,108 | — | — | — |
| " | Isaac B. Lewis | — | — | — | — | — | — | 176 | 497 | — | — | — |
| " | Thomas Lewis | — | — | — | — | — | — | 914 | 1,448 | — | — | — |
| " | Isaac F. Mayo | — | — | — | — | — | — | 1,264 | 1,162 | — | — | — |
| " | Joseph Mayo | — | — | — | — | — | — | 3,648 | 20 | — | — | — |
| " | R. W. Mayo | — | — | 8 | — | — | — | 17 | — | — | — | — |
| " | William Newcomb | — | — | 1,208 | — | — | — | 207 | — | — | — | — |
| " | T. K. Paine | — | — | — | — | — | — | 1,006 | 1,068 | — | — | — |
| " | James G. Itand * | — | — | — | — | — | — | 596 | 844 | — | — | — |

* One Spanish mackerel.

TABLE No. III. — GILL-NETS. — Showing the Catch of each for 1879 — Continued.

| TOWN OR PLACE. | PROPRIETOR. | Shad. | Alwives. | Sea-herring. | Striped Bass. | Scup. | Squeteague. | Mackerel. | Bluesh. | Tautog. | Flounders and Flat-fish. | Menhaden. | Eels. |
|----------------|---------------------------|-------|----------|--------------|---------------|-------|-------------|-----------|---------|---------|--------------------------|-----------|-------|
| Provincetown. | Reuben Ryder | - | - | 2,325 | - | - | - | 270 | 894 | - | - | - | - |
| " | Isaac Small | - | - | - | - | - | - | - | 1,816 | - | - | - | - |
| " | W. C. Snow | - | - | - | - | - | 422 | 185 | 953 | - | - | - | - |
| " | John Swift | - | - | - | - | - | - | 94 | 52 | - | - | - | - |
| " | R. Swift | - | - | - | - | - | - | 283 | 1,644 | - | - | - | - |
| " | Isaac Tyler | - | - | - | - | - | - | 82 | - | - | - | - | - |
| " | R. Wareham | - | - | 1,321 | - | - | - | 1,061 | 1,341 | - | - | - | - |
| " | J. C. Weeks | - | - | 1,256 | - | - | - | 1,853 | 473 | - | - | - | - |
| " | Joseph E. Weeks | - | - | - | - | - | - | 1,924 | 851 | - | - | - | - |
| Truro | Benjamin Coan | - | - | - | - | - | - | 423 | - | - | - | - | - |
| " | E. H. Collins | - | - | - | - | - | - | - | 70 | - | - | - | - |
| " | C. M. Grozier | - | - | - | - | - | - | 385 | 205 | - | - | - | - |
| " | I. Smith | - | - | - | - | - | - | 424 | 711 | - | - | - | - |
| " | J. T. Stevens | - | - | - | - | - | - | 427 | 295 | - | - | - | - |
| " | E. P. Worthen | - | - | - | - | - | - | 406 | 31 | - | - | - | - |

| | | | | | | | | | | | | | | | | | | | |
|-------------|---------------------------|---|---|---|---|---|-----|-----|---|---|---|---|-------|-------|----|-----|---|----|---|
| North Truro | P. L. Paine . | . | . | . | . | . | 131 | 29 | - | - | - | - | 820 | 296 | - | - | - | - | - |
| " | L. & R. Small . | . | . | . | . | . | - | - | - | - | - | - | 1,004 | 1,014 | - | - | - | - | - |
| South Truro | James N. Rich . | . | . | . | . | . | - | - | - | - | - | - | 91 | - | - | - | - | - | - |
| Eastham | Eldad Dill . | . | . | . | . | . | - | - | - | - | - | - | 765 | 2,385 | - | - | - | - | - |
| " | Russell Doane . | . | . | . | . | . | - | - | - | - | - | - | 848 | 4,255 | 3 | - | - | 35 | - |
| " | John Fulcher . | . | . | . | . | . | - | - | - | - | - | - | 75 | 2,296 | - | - | - | - | - |
| " | J. Penninan . | . | . | . | . | . | - | - | - | - | - | - | 2,377 | 7,355 | 10 | - | - | - | - |
| " | Chas. H. Smith . | . | . | . | . | . | - | - | - | - | - | - | 1,895 | 4,274 | - | - | - | - | - |
| Chatham | Anson Bloomer . | . | . | . | . | . | - | - | - | - | - | - | 1,052 | - | - | - | - | - | - |
| " | N. Eldredge . | . | . | . | . | . | - | - | - | - | - | - | 34 | - | - | - | - | - | - |
| " | J. Gill . | . | . | . | . | . | - | 303 | - | - | - | - | 1,827 | - | - | - | - | - | - |
| " | J. Gould . | . | . | . | . | . | - | - | - | - | - | - | 2,336 | 491 | - | 215 | - | - | - |
| " | A. Harding . | . | . | . | . | . | - | - | - | - | - | - | - | 69 | - | - | - | - | - |
| " | A. Mayo . | . | . | . | . | . | - | - | - | - | - | - | 1,355 | 1,363 | - | - | - | - | - |
| " | William Patterson | . | . | . | . | . | - | - | - | - | - | - | 1,922 | - | - | - | - | - | - |
| " | James F. Smith . | . | . | . | . | . | - | - | - | - | - | - | 2,022 | - | - | - | - | - | - |
| Harwich | Thomas Ellis . | . | . | . | . | . | - | - | - | - | - | - | 2,522 | 2,411 | - | - | - | - | - |
| Dennis | F. S. Crowell . | . | . | . | . | . | - | - | - | - | - | - | - | 1,187 | - | - | - | - | - |
| " | F. Joseph & N. Eldredge . | . | . | . | . | . | - | - | - | - | - | - | - | 7,982 | - | - | - | - | - |
| " | Venez Kelley . | . | . | . | . | . | - | - | - | - | - | - | - | 1,974 | - | - | - | - | - |

TABLE No. III. — GILL-NETS. — Showing the Catch of each for 1879 — Concluded.

| TOWN OR PLACE. | PROPRIETOR. | | | | | | | | | | Shad. | Alewives. | Sea-berring. | Striped Bass. | Scup. | Squeteague. | Mackerel. | Bluefish. | Tautog. | Flounders and Flat-fish. | Menhaden. | Eels. |
|--------------------|---------------------------|---|---|---|---|---|---|-------|----|-------|-------|-----------|--------------|---------------|-------|-------------|-----------|-----------|---------|--------------------------|-----------|-------|
| Hyannis . . . | D. Bearse . . . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | 5,500 | . | . | . | . |
| " . . . | H. C. Lumbert . . . | . | . | . | . | . | . | . | . | . | . | . | . | 47 | . | . | . | 2,018 | . | . | . | . |
| Centreville . . . | C. E. Bearse . . . | . | . | . | . | . | . | . | . | . | . | . | . | . | 97 | 9 | . | 2,638 | . | . | . | . |
| " . . . | W. H. Hallett . . . | . | . | . | . | . | . | . | . | . | . | . | . | 2 | 14 | . | . | 1,982 | 5 | . | . | . |
| " . . . | T. Kelley . . . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | 10 | . | 519 | . | . | . | . |
| " . . . | M. Sturges . . . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | 554 | . | . | . | . |
| Cotuitport . . . | A. C. Nickerson . . . | . | . | . | . | . | . | . | . | . | . | . | . | 337 | . | 6 | . | 5,422 | . | 978 | . | . |
| " . . . | I. C. Sturges . . . | . | . | . | . | . | . | . | . | . | . | . | 5 | . | 3 | . | . | 28 | . | . | 4,000 | . |
| Mattapoisett . . . | Bowman & Nye . . . | . | . | . | . | . | . | . | . | . | 4 | . | . | . | . | . | . | 864 | 374 | 370 | 1,850 | 7 |
| Falmouth . . . | E. H. Davis . . . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | 32 | . | 370 | . | . | . | . |
| " . . . | H. G. Fisher . . . | . | . | . | . | . | . | . | . | . | . | 5,025 | . | 36 | . | . | . | 197 | 5 | . | . | . |
| " . . . | R. T. Handy . . . | . | . | . | . | . | . | 7,537 | 44 | 11 | 93 | 89,014 | . | . | . | 104 | . | 595 | 415 | 3,681 | 84,365 | 386 |
| Fairhaven . . . | J. J. & J. C. Allen . . . | . | . | . | . | . | . | . | . | 3 | . | . | . | . | . | 2 | . | 377 | . | . | 30 | . |
| " . . . | D. W. Deane . . . | . | . | . | . | . | . | . | . | 1 | . | . | . | . | . | 9 | . | 453 | 1 | . | 107 | . |
| " . . . | B. T. Dunn . . . | . | . | . | . | . | . | 13 | 19 | 2,215 | 10 | 1,628 | . | . | . | 168 | . | 468 | 357 | 721 | 4,000 | 584 |

[illegible]

TABLE NO. IV. — CONNECTICUT RIVER SEINES.

| TOWN. | NAME. | Shad. | Plke. |
|----------------------------|-----------------------------|--------|-------|
| Agawam | A. Converse | 1,352 | - |
| “ | A. J. Hills | 596 | - |
| South Hadley | C. C. Smith | 6,296 | 3 |
| Chicopee | J. & H. W. Chapin | 1,224 | - |
| West Springfield | George A. White | 1,372 | - |
| Springfield | J. O. Leary | 69 | - |
| “ | R. H. Parker | 2,500 | - |
| | | 13,409 | 3 |

TABLE NO. V. — MERRIMACK RIVER SEINES.

| TOWN. | NAME. | Shad. | Striped Bass. | Alewives. | Perch. |
|-------------------------|--------------------------|-------|---------------|-----------|--------|
| North Andover | W. H. Day | 519 | 13 | - | - |
| Bradford | H. A. Nisbett | 187 | - | - | - |
| Haverhill | C. E. Ordway | 318 | 1 | - | - |
| Newbury | A. E. Larkin | - | - | 7,000 | - |
| “ | W. H. Morrison | - | - | 8,350 | - |
| “ | A. C. Nelson | - | 10 | 21,542 | 379 |
| “ | I. P. Newton | - | - | 1,405 | - |
| Amesbury | Jon. Morrill | 1,757 | 1 | - | - |
| | | 2,781 | 25 | 38,297 | 379 |

TABLE NO. VI. — TAUNTON RIVER SEINES.

| TOWN. | NAME. | Shad. | Alewives. | Striped Bass. |
|-------------------|---------------------------|-------|-----------|---------------|
| Bridgewater . . . | S. Leonard | - | 2,925 | - |
| Berkley | Nichols & Shove | 500 | 155,000 | - |
| Dighton | N. Chase and others . . . | 299 | 4,550 | - |
| “ | E. Hathaway | 450 | 85,100 | 125 |
| “ | C. N. Simmons | 640 | 120,000 | - |
| Middleborough . . | G. Brayton | - | 81,213 | - |
| Raynham | W. A. Robinson | 635 | 64,511 | - |
| “ | G. B. Williams | 203 | 72,184 | - |
| Taunton | J. W. Hart | 282 | 65,900 | - |
| | Total | 3,009 | 651,383 | 125 |

TABLE NO. VII. — OTHER FRESH-WATER SEINES, OR DIP-NET FISHERIES.

| TOWN. | NAME. | Shad. | Alewives. | Striped Bass. |
|---|---------------------------|-------|-----------|---------------|
| Weymouth | Weymouth Iron Company . | - | 145,600 | - |
| Kingston | Cobb & Drew | - | 24,272 | - |
| Sandwich | H. G. O. Ellis | - | 214,887 | - |
| Rochester and Matta- poisett | N. Hammond | - | 306,913 | - |
| Barnstable | Nine Mile Pond Fish Co. . | - | 20,645 | - |
| Brewster | J. Wixon and J. Howland . | - | 22,800 | - |
| Wellfleet | N. C. Nicholson | - | 29,581 | - |
| Mashpee | M. Amos | - | 30,000 | - |
| “ | W. F. Hammond | - | 11,038 | - |
| “ | W. R. Mingo | - | 9,509 | - |
| “ | G. T. Oakly | - | 1,174 | - |
| “ | W. H. Simon | - | 850 | - |
| Falmouth | C. E. Winch | - | 7,500 | - |

FIFTEENTH ANNUAL REPORT

OF THE

COMMISSIONERS

ON

INLAND FISHERIES,

FOR THE YEAR ENDING

SEPTEMBER 30, 1880.

BOSTON:

Band, Aberg, & Co., Printers to the Commonwealth,
117 FRANKLIN STREET.
1881.

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Commonwealth of Massachusetts.

To His Excellency the Governor and the Honorable Council.

THE Commissioners on Inland Fisheries beg leave to present their Fifteenth Annual Report.

Five years ago the Commissioners presented an epitome of the previous ten years' work. Since then a new undertaking—the collection of the statistics of our shore and river net-fisheries—has been added to their duties. The owners of about one thousand weirs, seines, gill-nets, &c., have made returns; the average number for the last four years being about two hundred and forty annually. The falling-off in the number from year to year rises, probably, not from a real decrease, but from the fact that many of the fishermen have given up the trade, and their successors have failed to apply for papers. A sufficient number of returns are now on hand to justify next year some statements of a general kind. Thirty-five ponds have been leased during the past five years, and one has been reserved by the State for experiments in fish-culture. In the same period there have been distributed of eggs or of young fish: Salmon, 339,000; California salmon, 727,500 (these two placed chiefly in the Merrimack and its tributaries, in connection with New Hampshire); land-locked salmon, 988,763 in 131 localities; trout, 39,500 in 11 localities; carp, 900 in 40 localities.

The building of fishways on our smaller streams has been encouraged, new ones have been put up, and antiquated forms replaced by improved models. Legislation has been watched, and the sessions of the Committee on Fisheries have been attended, on all important occasions, by one or more of the Commissioners. In this way trivial special legislation, to which our people are extremely addicted, has been les-

sened, and costly hearings and legislative litigation in large measure avoided.

FISHWAYS.

At the request of the inhabitants of Lancaster and other towns, application was made to the Commissioners of New Hampshire for the construction of fishways over the two dams on the Nashua River in that State, with the understanding that all the dams on the river should be provided with suitable passes. These two dams were the first on the river; and, in urging the completion of this work, the Board was simply doing what has always been its custom — viz., to commence at the lower part of the river, and clear the track upward to the headwaters. There was a delay of three years after the notice had been given to the New Hampshire Commissioners before any thing was done. The following note will explain, in part, the cause of the delay:—

NASHUA, N.H., June 2, 1877.

E. A. BRACKETT, Esq., *Massachusetts Fish Commissioner.*

Dear Sir,—Your recent visit here, together with previous visits and notifications from our New Hampshire Fish Commissioners, in relation to building a fishway at our dam on the Nashua River, prompts us to *re-build our dam* as early in the season of 1878 as circumstances will allow (which is earlier than actually necessary), at which time we shall be most happy to build a proper fishway; provided the Commissioners will plan and direct the construction of same.

Yours truly,

W. D. CADWELL, *Agt. Jackson Co.*

(By TEMPLE.)

The Fish Committee of Lancaster had, at their own expense, transported large numbers of young salmon to the headwaters of the river; and the expectation of their return led to persistent efforts on their part to have the fishways constructed as early as possible. These young fish were California salmon, hundreds of thousands of which, through the kindness of Professor Baird, have been distributed to the States, with a reasonable expectation that they would become acclimated and prove a valuable addition to our food fishes. Unfortunately, from some cause yet to be discovered, they have never returned; and this fact, becoming apparent immediately after the completion of the fishway at Nashua,

it was thought best not to push the completion of those above until some assurance could be given that they were needed.

The Bucksport Salmon Works, from which the eggs were procured which resulted in the successful stocking of the Merrimack River, had been closed through the withdrawal of any active co-operation by the United States Commissioner in favor of the more easily obtained California salmon-spawn. This year they have been re-opened, and a good supply of young Atlantic salmon will be put into the Nashua River the coming spring; and notice has been given to owners of dams at Groton and Pepperell that they will be required to put in fishways next summer.

SAUGUS RIVER.

The following letter announces the successful restocking of this river with alewives:—

WAKEFIELD, May 3, 1880.

MR. E. A. BRACKETT.

Dear Sir,—I have the pleasure of informing you that the re-opening and stocking of the Saugus River is a success. Yesterday thousands of alewives were seen in the river in Wakefield above all the fishways, and no doubt they are in the pond before this. The first alewives were planted in the pond three years ago this month, and those seen yesterday are the first that have been in Wakefield of their own accord for about thirty years.

Very respectfully,

OSCAR STOWELL.

SALMON IN THE MERRIMACK.

There was a large run of salmon in the Merrimack this year; but owing to the early and unprecedented drought, and the reckless depredations committed by the fishermen on the lower part of the river, comparatively few of them reached their spawning-grounds.

The salmon, kept back by the low water, congregated near North Andover and at the mouths of the brooks between there and Haverhill, and consequently became an easy prey to the poacher.

These depredations, which took place in the night, were not known until it was too late to remedy the evil.

The number taken cannot be correctly ascertained; but,

making due allowance for exaggerated reports, it is evident that enough salmon were destroyed to have yielded some hundreds of thousands of spawn.

The fish wardens at Lowell and Lawrence are men of character, and have faithfully discharged their duties; but many of the wardens below Lawrence are as useless as the fifth wheel to a coach. If they exercise any influence, it is in favor of the violation of law; and in some instances they are known to have directly aided in the destruction of the salmon.

A more efficient system of protection is demanded, not only in the interest of this State, but in justice to New Hampshire.

REPORT OF STATE HATCHING-HOUSE AT PLYMOUTH, N.H.

PLYMOUTH, N.H., Nov. 15, 1880.

To E. A. BRACKETT, *Commissioner of Inland Fisheries for the Commonwealth of Massachusetts.*

The 100,000 eggs mentioned in my last report, obtained from the salmon taken at the hatching-house on the Pemigewasset River, were hatched with a loss of four and a quarter per cent; or, in other words, 4,245 eggs failed to hatch.

In December, 1879, I received 45,000 Atlantic salmon-eggs from Bucksport, Me. These were hatched with a loss of 1,785. During the month of May the entire hatch of both lots (about 139,000) were put in the Pemigewasset River, from one to two miles above Livermore Falls. This year twenty-one salmon have been caught at the hatchery, varying in weight from seven to eighteen pounds. The nets were set May 26. The first salmon was caught June 10. By the 9th of July nineteen were captured. One of these injured herself in the pound, causing fungus to grow, from the effects of which she died on the 14th of July. After the 9th of July no salmon came up the river till Oct. 2. If we can trust the memory of the oldest inhabitant, the water was lower than it had ever been before.

A great many salmon were seen in the Merrimack during this dry spell. There was no considerable rise in the river till November; and undoubtedly they chose to spawn below the hatching-house rather than to come up to their spawning-ground so late in the season. Two, however, reached me in October,—one the 2d, and the other the 27th. As usual, all were caught in the night. Nine were females; and from them we have secured 60,000 eggs as follows:—

| | |
|----------------------------------|--------|
| Oct. 23, from one fish | 10,000 |
| 24, from three fish | 19,000 |
| 26, from two fish | 13,000 |
| 31, from two fish | 12,000 |
| Nov. 2, from one fish | 6,000 |
| | <hr/> |
| | 60,000 |

This season a little over 200,000 eggs have been taken from our breeding-trout, and a few are not ripe yet. The first spawn were taken Sept. 25.

Since my last report no money has been spent in improvements: but the people of New Hampshire are very anxious that the facilities for trout-breeding be increased, thinking that a little extra effort might place within the easy reach of all this rich and gamey fish, which will thrive in the small streams, and can be caught by those not specially skilful; and I recommend that six plank trout-ponds be built next spring as soon as the frost is out of the ground.

The expense would not be large, and it would greatly assist in producing, as well as procuring, the spawn.

Yours truly,

A. H. POWERS.

REPORT OF THE SUPERINTENDENT OF THE LAWRENCE FISHWAY.

LAWRENCE, MASS., Nov. 11, 1880.

E. A. BRACKETT, *Commissioner*.

Dear Sir, — I send you to-day my report of fish seen in the Lawrence fishway this year. Think it contains about every thing of any importance. There were more fish in the fishway (with perhaps the exception of alewives) the *first* of the summer than any season before. The inspections of the fishway, and observations by different parties from the bridges, go to show that in June the river was full of salmon. The unprecedented low water during August, September, and October, prevented a full run of fish, though lately — that is, since the 1st of November — suckers have appeared in some numbers; so I shall continue to keep water in the fishway, and draw off, until no fish are to be seen.

Quite a number of young alewives were seen in October, in the flume to the paper-mills on the north canal, trying to get down stream. I think they go through the wheels without getting much hurt, they are so small.

Yours respectfully,

THOS. S. HOLMES,

Superintendent Lawrence Fishery.

REPORT OF FISH SEEN IN THE LAWRENCE FISHWAY IN THE YEAR 1880.

April 26. A few suckers, first fish seen this year.

26 to May 6. Saw nothing but suckers and chubs. River high and muddy nearly all the time.

May 7. A few suckers, chubs, and lamper eels.

8. Suckers, chubs, and lamper eels, run large; a few alewives.

9. Suckers and chubs, run large; lamper eels and alewives, run small.

10. Suckers, chubs, lamper eels, and alewives, run moderate; one black bass.

- May 11. Suckers, run large; chubs, lamper eels, and alewives, run small; two black bass.
12. Suckers and lamper eels, run large; a few chubs and alewives, schools of "red-fin" shiners, one silver eel, one black bass.
13. Suckers and lamper eels, run very large; chubs and alewives, run small; two black bass.
14. Suckers, chubs, and lamper eels, run large; alewives, run moderate.
15. Suckers, chubs, lamper eels, and alewives, run large; one black bass.
16. Suckers, chubs, lamper eels, and alewives, run large; one black bass.
17. Suckers and lamper eels, run large; a few alewives.
18. Suckers, chubs, and lamper eels, run large; a few alewives.
19. Lamper eels, run large; a few suckers and chubs.
20. Lamper eels, run large; a few suckers, chubs, and alewives.
21. Lamper eels, run large; a few suckers, chubs, alewives, and silver eels (all the silver eels seen are *small* ones).
22. Suckers, chubs, and lamper eels, run large; a few alewives and silver eels.
23. Suckers, chubs, lamper eels, and alewives, run large; schools of "red-fin" shiners; a few silver eels.
24. Suckers, chubs, lamper eels, and alewives, run large.
25. Lamper eels, run moderate; a few suckers, chubs, alewives, and silver eels.
26. A few suckers, chubs, lamper eels, and silver eels.
27. A few suckers, chubs, lamper eels, and silver eels.
28. A few suckers, chubs, lamper eels, and silver eels.
29. A few suckers, chubs, and lamper eels; *one salmon, 10 lbs.*
30. A few suckers, chubs, and lamper eels.
31. A few suckers, chubs, lamper eels, and silver eels.
- June 1. A few lamper eels and silver eels, one black bass.
2. *One salmon, 10 lbs.*, and three black bass.
3. A few suckers and lamper eels; *three salmon, 10 to 14 lbs.*; and two black bass.
4. A few suckers, chubs, and lamper eels; *one salmon, 10 lbs.*; three black bass.
5. A few suckers and lamper eels; *five salmon, 10 to 12 lbs.*
6. A few suckers, lamper eels, and alewives; *one salmon, 8 lbs.*
7. A few suckers, lamper eels, and small silver eels.
8. A few suckers, lamper eels, and silver eels.
9. A few suckers, lamper eels, and silver eels.
10. A few suckers and lamper eels; *one salmon, 20 lbs.*
11. A few suckers, lamper eels, and silver eels.
12. Alewives, run large; lamper eels and suckers, run small.
13. Suckers, lamper eels, and alewives, run small; *one salmon, 8 lbs.*; one black bass.
14. A few suckers, lamper eels, and alewives.
15. A few suckers and lamper eels; *two salmon, 8 to 10 lbs.*

June 16. A few suckers, lamper eels, and silver eels; *three salmon*, 10 to 16 lbs.

17. A few suckers, lamper eels, and silver eels; *one salmon*, 15 lbs. (Saw three salmon under Broadway-street bridge.)

18. A few suckers, lamper eels, and silver eels.

19. A few suckers, lamper eels, and alewives, run large; *one salmon*, 10 lbs.; two black bass.

20. A few suckers, chubs, and alewives; one black bass.

21. At 6 A.M., *two salmon*, 10 to 14 lbs. At 8 A.M., shut water out because river was low. Found *two salmon* in the way (between 10 and 15 lbs. weight), and *one salmon* in a small pool just below the end of the fishway. All these fish put in river above in good condition.

During the rest of this week I saw a number of salmon in the pools at the foot of the dam. Arthur Dyer, Clarence Dyer, and Fred McLanathan (three well-known Lawrence gentlemen) undertook to count them one day, and made out there were fifteen of them. The next day another gentleman saw them, and thought some of them were shad.

26. Water let into fishway in P.M.

27. A few chubs and silver eels.

28. *One salmon*, 12 lbs. Water shut out at night; low river.

July 4. Water let into fishway in the morning. In the afternoon, a few suckers and silver eels in it.

5. A few suckers, chubs, and silver eels.

6. A few suckers, chubs, and silver eels; *one salmon*, 10 lbs.

7. A few suckers, chubs, and silver eels.

8. A few suckers, chubs, and silver eels.

9. A few suckers, chubs, and silver eels.

10. A few suckers and silver eels.

11. A few suckers, chubs, and silver eels.

12. A few suckers and silver eels.

13. Shut water out because the river was low.

17. Let water into fishway in the afternoon.

18. A few suckers, chubs, and silver eels. Water shut out at night.

22. Let water into fishway in the afternoon.

23. A few suckers, chubs, and silver eels.

24. A few suckers, chubs, and silver eels; one black bass.

25. A few suckers, chubs, and silver eels; *three salmon*, 10 to 14 lbs.

26. A few suckers and silver eels; two black bass.

27. A few suckers and silver eels.

28. A few suckers, chubs, and silver eels.

29. Shut water out; river very low.

31. Let water into fishway in the afternoon.

Aug. 1. A few suckers, chubs, and silver eels.

2. A few suckers and silver eels.

3. Shut water out this morning; river low.

7. Let water into fishway in the afternoon.

- Aug. 8. A few suckers, chubs, and silver eels.
 9. A few suckers, chubs, and silver eels.
 10. Water shut out; river very low.

From this time to the last of October the water was shut out of the fishway, excepting on Sunday, when the water came over the dam. The river was exceedingly low; has not been so low before since the dam was built. From the last week in October to Nov. 15, saw a few suckers in fishway. None seen on the 16th; so shut water out for the season.

Yours respectfully,

THOMAS S. HOLMES.

The drought of the last two years¹ has lowered the river in a way very injurious to salmon. This year, when the water was shut out of the fishway for a considerable part of the season, 28 salmon were seen against 29 in 1879, 17 in 1878, and 47 in 1877. With ordinary water the run of fish this year would have been perhaps the largest since the restocking of the stream.

LAND-LOCKED SALMON.

There is good reason to feel satisfied that this most desirable fish is being successfully established in many of our ponds. Individuals have already been taken weighing from one to three pounds.

Of the spawn received and hatched the past year, the following distribution was made:—

| | APPROXIMATE NO. |
|---|-----------------|
| J. A. George, pond in Mendon | 15,000 |
| E. S. Francis, pond in Pittsfield | 18,000 |
| W. C. Keiley, pond in Holliston | 5,000 |
| I. W. Adams, pond in Ashburnham | 10,000 |
| J. P. Hewins, pond in Sharon | 5,000 |
| George S. Boutwell, pond in Groton | 4,000 |
| V. B. Newcomb, pond in Brewster | 8,000 |
| Thos. H. Lawrence, pond in Falmouth | 4,000 |
| H. E. Priest, pond in Waltham | 2,000 |
| William Tinker, pond in Otis | 6,000 |
| H. Hobbs, pond in Wenham | 8,000 |
| C. W. Seabury, pond in Millbury | 4,000 |
| Asa French, pond in Braintree | 4,000 |
| G. L. Fessenden, pond in Sandwich | 2,000 |
| A. W. Bisbee, pond in Rochester | 4,000 |
| W. E. Gavit, pond in Stockbridge | 20,000 |

¹ On Aug. 1, 1880, the deficit from Jan. 1, 1879, as compared with the average rainfall, was about eighteen inches.

| | |
|---|--------|
| A. L. Hubbell, pond in Great Barrington | 20,000 |
| H. A. Bush, pond in Melrose | 2,000 |
| R. Noble, pond in Westfield | 20,000 |
| Dr. A. Eldridge, pond in Yarmouth | 8,000 |
| Winchester and Medford | 7,000 |

All parties ordering land-locked salmon must make application in writing, giving a careful description of the pond in which they desire to place them.

“The plan is to furnish them at the State hatching-house in Winchester, free of charge, to all applicants having under their control any of the great ponds of the State. For transportation, parties should bring with them good clean half-barrels or milk-cans holding ten or twelve gallons, a thermometer, and a dipper for aerating the water. The half-barrels will carry from four thousand to five thousand, and the milk-cans about three thousand.

“The introduction of these fish into ponds having neither inlet nor outlet will for the present be discontinued.”

A large supply, amounting to about three hundred thousand, will be ready for applicants next April and May, as appears from the following Report of the Superintendent of the Schoodic Salmon-breeding Establishment, controlled by State and National Governments:—

GRAND LAKE STREAM, ME., 23d November, 1880.

DEAR SIR, — We are almost through with spawning fish. Total product of eggs will be about 2,375,000. Losses and the reserve will probably reduce the number to 1,530,000, which I hope to ship. The large product of eggs will necessitate increased expenditure, and I now estimate the total at \$2,550. Your \$300 will entitle you to about 300,000 eggs. Hope to begin shipment early in January. Where do yours go?

At Bucksport, I presume, we shall be able to distribute 1,700,000 eggs; and your share will be about 200,000,—perhaps more. These ought to go in December. Can we send yours Dec. 15, or when?

Very truly yours,

CHS. G. ATKINS.

E. A. BRACKETT, Esq., Winchester, Mass.

As these fish are distributed under the care of one of the Commissioners at a time when his services are needed elsewhere, applicants are requested to come without delay when notified.

No orders will be received after the 20th of April.

TROUT.

“As the cultivation and rearing of trout more strictly comes within the scope of private enterprise, it has been thought best not to devote any more time or expense in that direction than was necessary to furnish the desired information in regard to it. At the time the lease was obtained of the grounds and ponds for the works at Plymouth, N.H., we were obliged to take with them some three hundred trout, with the provision that the same number should be returned at the expiration of the lease. These, with what have since been taken when fishing for salmon, furnish quite a number of breeding-fish, from which we have taken this year something over one hundred thousand spawn, one-half of which belongs to Massachusetts. The State has been to no additional expense in procuring these eggs; and it may be desirable to furnish a part of the young fish to persons having control of streams, on condition that they will keep a record, and furnish statistics in regard to them.

“There are other waters still open to the public, to which private parties would be willing to bear the expense of transportation for the sake of having streams restocked.”

The trout hatched this year were distributed to the following applicants:—

| | | | | | | |
|----------------------------|---|---|---|---|---|-------|
| Joseph Henderson, Boston | . | . | . | . | . | 1,500 |
| D. A. Eldridge, Yarmouth | . | . | . | . | . | 5,000 |
| Charles T. Jenkins, Salem | . | . | . | . | . | 4,000 |
| Mr. Eaton, Woburn | . | . | . | . | . | 5,000 |
| John Cummins, Woburn | . | . | . | . | . | 5,000 |
| Henry Hobbs, Wenham | . | . | . | . | . | 3,000 |
| Thomas Talbot, Billerica | . | . | . | . | . | 5,000 |
| Ivers Adams, Ashburnham | . | . | . | . | . | 5,000 |
| Carter's Brook, Wilmington | . | . | . | . | . | 4,000 |

There will be about one hundred thousand young trout ready for applicants the latter part of March or 1st of April next, delivered at the hatching-house in Winchester free of charge.

CONNECTICUT RIVER.

Beyond placing a superintendent over the fishway at Holyoke, no expense has been incurred and nothing done toward increasing the fish in the river.

The reasons for this have been so fully explained in previous reports, that it seems useless to rehearse them here. Neither the views of the fishermen, nor the opinions of those whose sense of duty should lead them to see that justice was done to a sister State, have changed for the better. On the contrary, countercharges have been made that the fishway at Holyoke was defective, if not entirely useless, and that the shad were destroyed on their spawning-grounds. Even the Commissioners of Connecticut have published in their report statements which, upon more careful investigation, might have been shown to be unreliable.

They seem to be unmindful of the fact that *the fishway at Holyoke was the result of the joint action of the Commissioners of the four States interested*, — viz., Vermont, New Hampshire, Massachusetts, and Connecticut, — and that the present able Commissioners of the last-named State were as much responsible for it as were those of Massachusetts. Certainly, no formal demand has been made by them to change it. There can be no question, that, had Connecticut shown any disposition to deal fairly in this matter, the Massachusetts Commissioners would have exhausted every means to correct any deficiency in the fishway, and in that effort would have been fully sustained by the State.

As to the sin of “taking shad on their spawning-beds,” imputed to the Massachusetts fishermen, it should be observed, that, no matter *where or at what time of the year* a fish is killed, its spawn is *equally destroyed*. Thus, a shad’s spawn is lost whether the fish be killed in December, eleven months before it would have spawned, or in June, eleven minutes before it would have spawned. Therefore, the Connecticut fisherman who takes a hundred shad at the river mouth destroys their spawn; and the Massachusetts fisherman who, two days later, takes another hundred at Holyoke from the same school, destroys *their* spawn. The returns presented below show that Connecticut, in 1879, took thirty-two times as many shad as did Massachusetts, and destroyed, therefore, thirty-two times as much spawn, which, otherwise, would have been deposited in the river.

The following statement is taken from the report of Connecticut for 1879:—

PIERS AND SEINES.

Piers and seines are classed together because a pier is simply a place made for the purpose of hauling a seine. Of these there are fifteen, and they took fifty thousand shad. The greatest number taken at any one place was eleven thousand at Selden's fish-place, a short distance below the Deep River station on the Connecticut Valley Railroad. These statistics comprise only that portion of the river from Deep River down, and the number of shad taken above can only be estimated. Those whose opinions are considered valuable make this estimate fifty thousand, which is accurate enough for practical purposes.

The whole number of shad taken, then, in 1879, in the Connecticut River and sound adjacent, is as follows:—

| | | | | | | | | | | | | | | | | | | | | |
|-----------|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|----------------------|
| Pounds | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | 250,026 |
| Gill-nets | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | 86,955 |
| Seines | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | 100,000 |
| | | | | | | | | | | | | | | | | | | | | <hr/> |
| | | | | | | | | | | | | | | | | | | | | 436,918 ¹ |

Let it be supposed that the fishermen received fourteen dollars per hundred for shad, and the money value of the catch is \$61,177.34; or if it be assumed that each shad weighed three pounds, and the retail price was eight cents per pound, the value would be \$104,875.44, which shows what interest the citizens of Connecticut have in the shad-fisheries of this one river.

The report for this State for the same season will show the difference in the catch of the two States.

TABLE NO. IV. — CONNECTICUT RIVER SEINES.

| TOWN. | NAME. | Shad. | Pike. |
|--------------------------|---------------------------|--------|-------|
| Agawam | A. Converse | 1,352 | — |
| “ | A. J. Hills | 596 | — |
| South Hadley | C. C. Smith | 6,296 | 3 |
| Chicopee | J. & H. W. Chapin | 1,224 | — |
| West Springfield | George A. White | 1,372 | — |
| Springfield | J. O. Leary | 69 | — |
| “ | R. H. Parker | 2,500 | — |
| | | <hr/> | <hr/> |
| | | 13,409 | 3 |

The total money value, at fourteen dollars per hundred, would be —

| | |
|-----------------------------|------------|
| For Massachusetts | \$1,876 00 |
| Connecticut | 61,177 34 |

¹ It should be understood that these figures relate only to shad of three pounds and over. Small shad are not counted.

These figures are mainly correct, and against them no charge or countercharge can avail.

They show conclusively, that, while the breeding-grounds are in this State, the catch of fish is almost wholly in Connecticut.

INTRODUCTION OF CARP (*Cyprinus Carpio*).

It has been generally understood that Professor Baird, United States Commissioner on Fisheries, has been successful in introducing the Austrian carp into this country. and that extensive breeding-ponds have been prepared at Washington for the purpose of raising and distributing these fish. Understanding that a supply could be had for this State, sufficient to stock several breeding-ponds, in October messengers were sent to Washington, and received five hundred of these fish, which were successfully transported to Winchester, with a loss of only two. Four hundred of them were sent to the Tewksbury Reservoir for safe keeping until suitable breeding-ponds can be secured. The balance, with a subsequent shipment of eight hundred by Professor Baird, were distributed as follows:—

| | |
|--------------------------------|------------------------------|
| Fish Committee | Holliston. |
| Hon. William Claflin | Newtonville. |
| Charles T. Jenkins | Salem. |
| W. F. Martindale | Enfield. |
| John L. Shorey | 36 Bromfield Street, Boston. |
| William Perham | Tyngsborough. |
| H. L. Loomis | Westfield. |
| C. H. Lawrence | South Lancaster. |
| H. C. Stark | Hyde Park. |
| Howard M. Monroe | Lexington. |
| Dr. D. Russell | Milford. |
| Lemuel Harris | Charlemont. |
| Francis E. Loud | Weymouth. |
| G. H. Richards | 16 Pemberton Square, Boston. |
| John A. Blake | Ipswich. |
| George C. McIntosh | Needham. |
| Samuel Clark | Leominster. |
| James G. Grinnell | Greenfield. |
| Hiram Packard | Goshen. |
| Thomas L. Peers | East Brookfield. |
| J. A. George | Mendon. |
| S. Morgan | Springfield. |
| John Birkenhead | Mansfield. |

| | | | | | | |
|------------------------|---|---|---|---|---|------------------------|
| Frank E. Horton | . | . | . | . | . | Plainville. |
| Burton Hathaway | . | . | . | . | . | Islington. |
| Daniel L. Mitchell | . | . | . | . | . | Taunton. |
| R. J. Butterfield | . | . | . | . | . | West Chelmsford. |
| James W. Hannum | . | . | . | . | . | Ludlow. |
| Oliver Ames | . | . | . | . | . | North Easton. |
| James Carter | . | . | . | . | . | Wakefield. |
| Leonard Huntress | . | . | . | . | . | Tewksbury. |
| Walter H. Knight | . | . | . | . | . | South Framingham. |
| Martin Green | . | . | . | . | . | Green Hill, Worcester. |
| Alexander Johnson | . | . | . | . | . | Wiscasset, Me. |
| Joseph Young | . | . | . | . | . | South Sanford, Me. |
| G. H. M. Barrett | . | . | . | . | . | Rockport, Me. |
| Augustus Eastman | . | . | . | . | . | North Conway, N.H. |
| Benjamin F. Vittum | . | . | . | . | . | Dover, N.H. |
| Stillman S. Hutchinson | . | . | . | . | . | Milford, N.H. |

The carp is a vegetable-feeder, exceedingly rapid in growth, and will thrive in water too warm and sluggish for the successful culture of other fish. There are in this State hundreds of acres of meadow and swamp land now producing little or nothing, which could, with very little outlay, be used for this purpose. Valleys with no permanent stream running through, but having a large water-shed, by having a dam thrown across, could be made available. The geographical character of New England is such as to afford enormous facilities for the cultivation of carp. The farmer has only to learn the few simple facts, in regard to the nature and habits of this fish, to turn much waste land to profit. A sufficient number have been secured by the State for breeding purposes, to produce hundreds of thousands in a few years for distribution. It is intended to distribute them broadcast over the State,—first to those who have artificial ponds for their culture, and then into all public waters suitable for them. It is to be noticed that no effort will be made to stock rivers and ponds containing other fish, until the supply is abundant. In ponds containing no other fish, five or six carp to the acre are sufficient for stocking. In procuring and making arrangements to breed these fish for general distribution, we have no theories or speculations to offer, but simply call attention to, and place within reach of, farmers and land-owners an industry which has been profitably carried on in Europe for centuries. In Austria and Bohemia it is an

extensive business. The Prince of Schwarzenberg possesses more than two hundred and fifty ponds of large size, the smallest having about ten acres' and the largest two thousand acres' water extent. The carp is the hog of the water, feeding upon roots, weeds, and all kinds of refuse-matter, rapid in growth, sometimes reaching the weight of fifty or sixty pounds. As an edible fish he is neither salmon nor trout any more than pork is venison. He is the fish for the million. Walton says, "The carp is the queen of rivers; a stately, a good, and a very subtle fish."

Hessel says, "If the carp were a fish of inferior quality, like the buffalo-fish, for instance, its sale would doubtless be limited to the seaport towns of Northern Germany and the principal cities of Central Europe, as Vienna, Berlin, and Paris. In the latter city, in spite of an abundant supply of salt-water and different kinds of fresh-water fish, the carp is ever preferred to these; and, with the exception of trout and salmon, it frequently commands a price three times as high as that of all the rest. For directions how to fish for carp, with some quaint remarks on the habits of this fish, see "Izaak Walton's Complete Angler." In the Appendix will be found an essay on the "Cultivation of Carp" by Rudolph Hessel, superintendent of the carp-ponds at Washington.

Applications for these fish will be placed on file, and as soon as possible filled in the order of their reception.

While, owing to the drought, the past season has been unfavorable for the inland fisheries, there has, nevertheless, been a large increase in many places. Quite a number of the leased ponds, so far as can be ascertained by the reports, have fully met the expectations of the lessees.

Unfortunately, many of those who have ponds under their care have not kept such record as is required by their lease; and their returns are simply estimates without any reliable data. This is especially the case where ponds are leased to towns, and where individual responsibility seems to be almost totally ignored.

There are in this State 196,342 acres of land covered with water, and the object in leasing the ponds is to ascertain how far they can be made productive.

All the leases require, that, on the 1st of October of each year, the lessee shall make returns to the Commissioners of

2d, The taking of land-locked salmon is prohibited until further notice. All salmon caught to be returned to the water *alive*, and all black bass under one pound in weight to be returned to the water *alive*.

3d, No set lines, nets, or traps of any description to be allowed in said waters.

4th, The taking of fish to be confined to naturally or artificially baited hook and hand-line.

5th, No person will be allowed to take fish from said pond for the purpose of sale.

6th, Any person failing to comply with the above regulations shall be liable for such neglect, and shall forfeit said permit and the right of renewal for a term not less than one year.

7th, Nothing in the above regulations shall be construed as giving any right to take fish at times when prohibited by law.

Approved June 1, 1880.

E. A. BRACKETT,
ASA FRENCH,
Commissioners on Inland Fisheries.

PERMISSION IS HEREBY GIVEN TO _____ to fish in Wedge Pond in Winchester, and in Mystic Pond in Medford and Winchester, subject to the following rules and regulations, established by the Commissioners on Inland Fisheries of Massachusetts, on Mondays, Wednesdays, and Saturdays, from April 1, 188 , to December 1, 188 , when this permit is to be returned to the Fish Committee of Winchester :—

The taking of land-locked salmon is prohibited until further notice. All salmon caught to be returned to the water *alive*, and all black bass caught under one pound in weight to be returned to the water *alive*.

No set lines, nets, or traps of any description to be allowed in said ponds, and the taking of fish to be confined to naturally or artificially baited hook and hand-line.

No person will be allowed to take fish from said ponds for the purpose of sale.

Any person failing to comply with the above regulations shall be liable for such neglect, and shall forfeit this permit and the right of renewal for a term not less than one year.

Nothing in the above regulations shall be construed as giving any right to take fish at times when prohibited by law.

On the first day of December this permit is to be returned, and with it the numbers, species, and estimated weight of fish taken from Oct. 15.

| SPECIES. | Number. | Weight. | Committee. |
|----------------------------|---------|---------|------------|
| Land-locked salmon | | | |
| Black bass | | | |
| Perch | | | |
| White perch | | | |
| Pickarel | | | |
| Other fish | | | |

On the 15th day of October tear off at dotted line, and send to Committee with the sender's name attached.

| SPECIES. | Number. | Weight. |
|------------------------------|---------|---------|
| Land-locked salmon | | |
| Black bass | | |
| Perch | | |
| White perch | | |
| Pickarel | | |
| Other fish | | |

NAME,.....

There will be between five and six hundred thousand young salmon and trout ready for delivery at the hatching-house in Winchester next spring. This, with the large number of both the mirror and leather carp for breeding purposes, and for which ponds will be immediately prepared, will enable us to meet more fully the demands made upon the commission for the distribution of young fish.

LEGISLATION.

Professor Spencer F. Baird, the United States Commissioner, has called our attention to the fact that the present statute requiring returns to be made of fish taken by fixed apparatus and by nets is inconvenient, because it *ends the year on Oct. 1*; so that, in practice, the fish that are taken between the middle of September and the middle of October are not returned at all. To remedy this defect, the Commissioners respectfully suggest that chap. 104 of the Acts of 1876 be amended by substituting in sect. 1, before the

word *day*, the word *twentieth*, instead of the word *first*; so that the section shall read, —

SECTION 1. The owner or owners of every pound, weir, or other similar fixed contrivance, or of any fishing pier, seine, drag or gill net, used in any of the waters of this State for fishing purposes, shall make written report, under oath, to the Commissioners on Inland Fisheries, on or before the twentieth day of October in each year, specifying the number of each kind of edible fish caught by his or their respective pounds, weirs, or other similar fixed contrivances, piers, seines, drag or gill nets, during the year next preceding the date of said report.

Chap. 119 of the Acts of 1877 forbids the establishing of any “fish-weir” without a permit from town or city authorities. Fishermen have set various *modifications* of the weir in defiance of the statute, and have called them by other names. To do away with all doubt as to the nature of the apparatus referred to, the Commissioners respectfully suggest the insertion, after the word *fish-weir*, of the words *pound*, *pound-net*, *fyke*, *trap*, or *similar fixed contrivance*; so that the section shall read, —

SECT. 4. No person shall construct or maintain any fish-weir, pound, pound-net, fyke, trap, or similar fixed contrivance within the tide-waters of this Commonwealth, unless authorized in the manner set forth in the first section of this Act, or from any island within said tide-waters, without authority in writing from the mayor and aldermen of every city, and the selectmen of every town, distant not over two miles from said island. Any person who shall construct or maintain any fish-weir, pound, pound-net, fyke, trap, or similar fixed contrivance, in violation of the provisions of this section, shall forfeit the sum of ten dollars for each day he shall maintain such weir or similar fixed contrivance, to be recovered in any court of competent jurisdiction to the use of any cities or towns from the mayor and aldermen or selectmen of which he ought to have obtained the authority aforesaid, and shall also be liable to be indicted therefor and to be enjoined therefrom.

For the proper protection of salmon in the Merrimack, it may seem wise to the Legislature to grant more days for fishing at the beginning of the season, and to shorten the season at its end.

THEODORE LYMAN,
E. A. BRACKETT,
ASA FRENCH,

Commissioners on Inland Fisheries.

EXPENSES OF COMMISSION.

| | |
|-------------------------------|------------|
| Salary | \$1,650 00 |
| Travelling expenses | 257 00 |
| | <hr/> |
| | \$1,937 90 |

GENERAL EXPENSES.

| | |
|---|------------|
| Subscription to fund of Schoodic Salmon-breeding Establishment | \$500 00 |
| Subscription to fund of Penobscot Salmon-breeding Establishment | 500 00 |
| A. H. Powers, services | 375 00 |
| Detectives, services and expenses | 267 70 |
| F. D. Brackett, services | 166 15 |
| Printing | 86 66 |
| Sewell Reed, services | 83 00 |
| Sundry laborers | 78 75 |
| Thomas S. Holmes | 70 00 |
| Wire and nets | 51 53 |
| Rent of land, Winchester | 50 00 |
| Robert Holmes, services and expenses | 36 45 |
| E. C. Young, services | 32 50 |
| Expressage | 23 62 |
| Legal service | 27 00 |
| Rent, &c., at Plymouth | 25 00 |
| E. H. Clark, services and expenses | 20 40 |
| Rubber boots and gloves | 15 45 |
| Fish meat | 6 99 |
| Stencils | 2 76 |
| Miscellaneous | 50 |
| | <hr/> |
| | 2,419 46 |
| | <hr/> |
| | \$4,357 36 |

APPENDIX.

[A.]

COMMISSIONERS ON FISHERIES.

UNITED STATES.

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| RICHARD U. SHERMAN | . New Hartford. |
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| S. W. WORTH (superintendent of fisheries) | . Morgantown. |

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SOUTH CAROLINA.

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| W. T. TURLEY | . Knoxville. |

TEXAS.

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| J. H. DINKINS | . Austin. |
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UTAH.

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| A. P. Rockwood (absent; information from Prof. J. L. Barfoot, curator Desert Museum) | } Salt Lake City. |
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VERMONT.

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| CHARLES BARRETT | . Grafton. |

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Col. MARSHALL McDONALD Lexington.

WEST VIRGINIA.

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 CHRISTIAN S. WHITE Romney.
 N. M. LOWRY Hinton.

WISCONSIN.

Gov. WILLIAM E. SMITH, *ex officio* Madison.
 PHILO DUNNING, president Madison.
 J. V. JONES Oshkosh.
 C. VALENTINE, secretary and treasurer Janesville.
 MARK DOUGLAS Melrose.
 JOHN F. ANTISDEL Milwaukee
 CHRISTOPHER HUTCHISON Beetown.
 H. W. WELSHER, superintendent Madison.

DOMINION OF CANADA.

W. F. WHITCHER Ottawa.

[B.]

LISTS OF PONDS LEASED.

By the Commissioners on Inland Fisheries, under Authority given by Chap. 384, Sect. 9, of the Acts of 1869.¹

1870.

- Feb. 1. Waushakum Pond, in Framingham, to Sturtevant and others, 20 years.
Mar. 1. Tisbury Great Pond, in Tisbury and Chilmark, to Allen Look and others, 10 years.
April 1. Mendon Pond, in Mendon, to Leonard T. Wilson and another, 20 years.
Sept. 12. Baptist Lake, in Newton, to J. F. C. Hyde and others, 20 years.
Oct. 15. Archer's Pond, in Wrentham, to William E. George, 15 years.

1871.

- Jan. 10. Nine Mile Pond, in Wilbraham, to B. F. Bowles, 10 years.
30. Little Pond, in Falmouth, to F. H. Dimmick, 10 years.
April —. Spectacle, Triangle, and Peters Ponds, in Sandwich, to G. L. Fessenden and another, 5 years.
17. Long Pond, in Falmouth, to Joshua S. Bowerman and three others, 20 years.
May 15. Pratt's Pond, in Upton, to D. W. Batcheller, 20 years.
18. Little Sandy Pond, in Plymouth, to William E. Perkins, 15 years.
Nov. 1. Punkapoag Pond, in Randolph and Canton, to Henry L. Pierce, 20 years.

1872.

- Jan. 1. Sandy Pond, Forest Lake, or Flint's Pond, in Lincoln, to James L. Chapin and others, 20 years.
July 20. Little Pond, in Braintree, to Eben Denton and others, 20 years.

¹ We would remind lessees of ponds that they are required, by their leases, to use all reasonable efforts to stock their ponds, and keep accurate records of the same, and make returns of their doings to the Commissioners on the *1st of October*, each year, of the number and species of fish which they have put in or removed from their ponds. Any failure to comply with these conditions is a breach of contract invalidating their lease. It is important that the State should know just what is being done; and, where there appears to be mismanagement or apparent failure, the Commissioners will visit the ponds, and ascertain, if possible, the cause.

1873.

- May 1. Meeting-house Pond, in Westminster, to inhabitants of Westminster, 15 years.
 1. Great Pond, in Weymouth, to James L. Bates and others, 15 years.
- July 1. Little Sandy Pond, in Pembroke, to A. C. Brigham and others, 16 years.
- Sept. 1. Pontoosuc Lake, in Pittsfield and Lanesborough, to E. H. Kellogg and others, 15 years.
- Oct. 1. Farm Pond, in Sherborn, to inhabitants of Sherborn, 15 years.
 1. Spot Pond, in Stoneham, to inhabitants of Stoneham, 15 years.
- Nov. 1. Lake Chaubunagungamong, or Big Pond, in Webster, to inhabitants of Webster, 5 years.
- Dec. 1. Lake Wauban, in Needham, to Hollis Hunnewell, 20 years.

1874.

- Mar. 1. Walden and White Ponds, in Concord, to inhabitants of Concord, 15 years.
 2. Upper Naumkeag, in Ashburnham, to inhabitants of Ashburnham, 20 years.
- April 1. Elder's Pond, in Lakeville, to inhabitants of Lakeville, 15 years.
 20. North and South Podunk Ponds, in Brookfield, to inhabitants of Brookfield, 15 years.
- May 1. Maquan Pond, in Hanson, to the inhabitants of Hanson, 15 years.
 2. Brown's Pond, in Peabody, to John L. Shorey, 15 years.
 16. Wickaboag Pond, in West Brookfield, to Lemuel Fullam, 15 years.
 20. Unchechewalom and Massapog Ponds, to the inhabitants of Lunenburg, 20 years.
- July 1. Hardy's Pond, in Waltham, to H. E. Priest and others, 15 years.
 1. Hockomocko Pond, in Westborough, to L. N. Fairbanks and others, 15 years.
 11. Mitchell's Pond, in Boxford, to R. M. Cross and others, 15 years.
 11. Hazzard's Pond, in Russell, to N. D. Parks and others, 20 years.
- Oct. 1. East Waushacum Pond, in Sterling, to inhabitants of Sterling, 20 years.
 20. Middleton Pond, in Middleton, to inhabitants of Middleton, 15 years.

1875.

- Jan. 1. White and Goose Ponds, in Chatham, to George W. Davis, 15 years.
- Mar. 1. Lake Pleasant, in Montague, to inhabitants of Montague, 10 years.

1875.

- Mar. 1. Hood's Pond, in Ipswich and Topsfield, to inhabitants of Topsfield, 15 years.
- April 1. Chauncey Pond, in Westborough, to inhabitants of Westborough, 15 years.
3. West's Pond, in Bolton, to J. D. Hurlburt and others, 15 years.
15. Gates Pond, in Berlin, to E. H. Hartshorn and others, 15 years.
24. Pleasant Pond, in Wenham, to inhabitants of Wenham, 15 years.
- May 1. Morse's Pond, in Needham, to Edmund M. Wood, 15 years.
1. Great Pond, in North Andover, to Eben Sutton and others, 20 years.
1. Chilmark Pond, in Chilmark, to J. Nickerson and others, agents, 20 years.
- July 1. Winter Pond and Wedge Pond, in Winchester, to inhabitants of Winchester, 15 years.
1. Haggett's Pond, in Andover, to inhabitants of Andover, 20 years.
- Aug. 1. Oyster Pond, in Edgartown, to J. H. Smith and others, 20 years.
7. West Waushacum Pond, in Sterling, to inhabitants of Sterling, 20 years.
9. Mystic (Upper) Pond, in Winchester, Medford, and Arlington, to inhabitants of Winchester and Medford, 15 years.
- Oct. 1. Little Chauncey and Solomon Ponds, in Northborough, to inhabitants of Northborough, 15 years.

1876.

- Feb. 1. Great Sandy Bottom Pond, in Pembroke, to Israel Thrasher and others, 15 years.
- Mar. 1. Dennis Pond, in Yarmouth, to inhabitants of Yarmouth, 15 years.
1. Crystal Lake, in Wakefield, to Lyman H. Tasker and others, 15 years.
20. Lower Naumkeag Pond, in Ashburnham, to inhabitants of Ashburnham, 18 years.
28. Dennison Lake, in Winchendon, to inhabitants of Winchendon, 15 years.
28. Phillipston Pond, in Phillipston, to inhabitants of Phillipston, 20 years.
- May 8. South-west Pond, in Athol, to Adin H. Smith and others, 15 years.
- June 1. Norwich Pond, in Huntington, to inhabitants of Huntington, 20 years.
10. Dug Pond, in Natick, to W. P. Bigelow and others, 15 years.
- Oct. 1. Farm and Learned's Pond, in Framingham, to inhabitants of Framingham, 15 years.

1876.

- Oct. 1. Whitney's Pond, Wrentham, to inhabitants of Wrentham, 15 years.
 1. Little Pond, in Barnstable, to George H. Davis, 15 years.

1877.

- Mar. 1. Nine Mile Pond, in Wilbraham, to inhabitants of Wilbraham, 15 years.
 15. Pentucket and Rock Ponds, in Georgetown, to inhabitants of Georgetown, 15 years.
 Aug. 10. Onota Lake, in Pittsfield, to William H. Murray and others, 15 years.
 Oct. 1. Fort, Great Spectacle, and Little Spectacle Ponds, in Lancaster, to inhabitants of Lancaster, 20 years.
 1. Battacook Pond, in Groton, to George S. Graves and others, 15 years.
 Nov. 1. Tispaquin Pond, in Middleborough, to Abishai Miller, 15 years.
 1. Asnebumskitt Pond, in Paxton, to Ledyard Bill and others, 15 years.
 Jan. 1. Snituit, Long, Snow, and Mary's Ponds, in Rochester, to inhabitants of Rochester, 15 years.
 Mar. 16. Asnaconcomic Pond, in Hubbardston, to Amory Jewett, jun., 15 years.
 April 1. Dorrity Pond, in Millbury, to inhabitants of Millbury, 10 years.
 May 1. Spectacle, Peters, and Triangle Ponds, in Sandwich, to George L. Fessenden, 10 years.
 1. Bear Hill Pond and Hall Pond, in Harvard, to inhabitants of Harvard, 15 years.
 July 1. Lake Buell, in Monterey and New Marlborough, to Andrew L. Hubbell and others, 5 years.
 Oct. 1. Eel Pond, in Melrose, to J. A. Barrett and others, 15 years.
 1. Accord Pond, in Hingham, South Scituate, and Rockland, to inhabitants of those towns, 10 years.
 1. Wright's and Ashley's Ponds, in Holyoke, to Henry C. Ewing and others, 10 years.
 1. Magog Pond, in Acton and Middleton, to inhabitants of Acton, 15 years.
 Halfway Pond, in Plymouth, taken by Commissioners for 5 years from March 1, 1878, in accordance with provisions of chap. 62 of the Acts of 1876.

1879.

- Feb. 1. Lake Mahkunac and Lake Overic, in Stockbridge, to inhabitants of Stockbridge, 10 years.
 June 1. "Bald Pate," "Four Mile," and "Stiles" Ponds, in Boxford, to inhabitants of Boxford, 10 years.
 July 1. Silver Lake, in Wilmington, to inhabitants of Wilmington, 10 years.
 1. Fresh Pond, in Falmouth, to Thomas H. Lawrence, 20 years.

1879.

- Oct. 1. Pomp's Pond, in Andover, to inhabitants of Andover, 15 years.
Nov. 1. Lake Quinapowitt, in Wakefield, to inhabitants of Wakefield, 14 years.

1880.

- Jan. 1. Granite Cove Pond, in Gloucester, to David Babson, 10 years.
Mar. 1. Lake Winthrop, in Holliston, to inhabitants of Holliston, 15 years.
15. Massapoag Pond, in Sharon, to inhabitants of Sharon, 10 years.
May 1. Tisbury Great Pond, in Tisbury, to Allen Look and others, 10 years.
June 1. Indian Pond, in Kingston, to inhabitants of Kingston, 10 years.
1. Jordan Pond, in Shrewsbury, to inhabitants of Shrewsbury, 15 years.
July 1. Swan and Martin's Ponds, in North Reading, to inhabitants of North Reading, 15 years.
Sept. 1. Herring Pond, in Eastham, to William H. Nickerson, 10 years.

[C.]

LEGISLATION. — 1880.

[CHAP. 61.]

AN ACT TO REGULATE FISHING IN CERTAIN WATERS BY FISH
POUNDS AND OTHER FIXED APPARATUS.*Be it enacted, &c., as follows:*

SECTION 1. From the first day of May to the fifteenth day of June in each year no person shall set, or permit to remain set, any fish pound, weir, trap, fyke or other similar fixed apparatus for catching fish, except gill nets, between the hours of six o'clock on Saturday morning and six o'clock on the succeeding Sunday evening, so as to catch any fish, in the tidal waters of the county of Dukes County and of the county of Bristol and of the towns of Mattapoisett, Marion and Wareham in the county of Plymouth, and in the tidal waters on the westerly boundaries of the towns of Sandwich and Falmouth at and near Buzzard's Bay, and on that portion of the southerly boundary of the county of Barnstable extending from the south-westerly corner of the town of Falmouth easterly to Point Gammon in the town of Yarmouth.

SECT. 2. Whoever by himself or by his servants or agents, or as the servant or agent of another, violates any of the provisions of this act, shall be punished by a fine of not more than two hundred dollars nor less than one hundred dollars.

SECT. 3. One-half of the penalty paid on conviction shall be for the use of the person commencing the prosecution whether by complaint or indictment.

SECT. 4. All prosecutions under this act shall be commenced within three months after the offence committed and not afterwards.

SECT. 5. The provisions of this act shall not be construed so as to permit fishing with such fixed apparatus where it is now forbidden by law. [*Approved March 5, 1880.*]

[CHAP. 68.]

AN ACT TO REGULATE THE TAKING OF SALMON IN THIS COMMON-
WEALTH.*Be it enacted, &c., as follows:*

SECTION 1. Whoever takes or catches any salmon in any of the waters of this Commonwealth for a period of two years from and after the first day of April in the year eighteen hundred and eighty shall be

punished for each offence by a fine not less than fifty nor more than two hundred dollars, or by imprisonment in the house of correction not less than two nor more than six months: *provided*, that any one catching salmon when lawfully fishing, and immediately returning them alive to the waters whence taken, shall not be subject to the penalty provided in this section.

SECT. 2. Except as provided in the last clause of the preceding section, whoever takes or catches any salmon at any time in any of the waters of this Commonwealth, except with naturally or artificially baited hook and hand line, shall be punished, for each fish so taken or caught, by a fine of not less than fifty nor more than two hundred dollars. [*Approved March 8, 1880.*]

[CHAP. 86.]

AN ACT RELATING TO SALMON TROUT.

Be it enacted, &c., as follows:

SECTION 1. The provisions of chapter two hundred and twenty-one of the acts of the year eighteen hundred and seventy-six shall not apply to the species of fish known as salmon trout, provided the same have not been taken in any of the waters of this Commonwealth.

SECT. 2. This act shall take effect upon its passage. [*Approved March 11, 1880.*]

[CHAP. 122.]

AN ACT TO AUTHORIZE THE TOWNS OF DENNIS AND YARMOUTH TO REGULATE THE SALMON AND TROUT FISHERY IN BASS RIVER.

Be it enacted, &c., as follows:

SECTION 1. Section one of chapter thirty-seven of the acts of the year eighteen hundred and forty-nine, entitled "An Act to authorize the towns of Dennis and Yarmouth to regulate the fisheries in Bass River," is hereby amended by inserting after the words "herrings or alewives and perch," the words "salmon and trout;" and after the words "Bass River," the words "at the mouth thereof;" and section four of said chapter is hereby amended by inserting after the words "herrings, alewives or perch," the words "or salmon or trout," and by striking out of the last line of said section four the word "twenty," and inserting in lieu thereof the word "forty."

SECT. 2. This act shall take effect upon its passage. [*Approved March 19, 1880.*]

[CHAP. 200.]

AN ACT TO AUTHORIZE THE SELECTMEN OF TOWNS AND THE BOARDS OF MAYOR AND ALDERMEN OF CITIES IN THE COMMONWEALTH TO CONTROL CERTAIN FISHERIES WITHIN SAID TOWNS AND CITIES.

Be it enacted, &c., as follows:

SECTION 1. The selectmen of all towns and the board of mayor and aldermen of cities within the Commonwealth shall have full power when

so instructed by said towns and cities to control and regulate the taking of eels, clams, quahaugs and scallops within their respective towns and cities, including ponds which are now or may hereafter be leased by the fish commissioners under chapter three hundred and eighty-four of the acts of the year eighteen hundred and sixty-nine; and may grant permits prescribing the times and methods of taking eels and the shell fish above named within their said towns and cities, and may make such other regulations in regard to said fisheries as they may deem wise and expedient. But the inhabitants of any city or town, without such permit, may take from the waters of their own or other cities and towns, eels and shell fish above named for their own family use; and from the waters of their own towns they may take any of the shell fish above named for bait, not exceeding three bushels, including shells, in any one day, but subject nevertheless to the general rules prescribed by the selectmen of towns and the boards of mayor and aldermen in cities as to the times and methods of taking said fish.

SECT. 2. Whoever takes any eels or any of the shell fish mentioned in the preceding section without such permit, and in violation of this act, shall on conviction pay a fine of not less than three nor more than fifty dollars and costs of prosecution; said fine and forfeiture imposed under this act to be recovered by indictment or complaint before any trial justice or any court of competent jurisdiction within either of said counties.

SECT. 3. All acts and parts of acts inconsistent with this act are hereby repealed.

SECT. 4. This act shall take effect upon its passage. [*Approved April 17, 1880.*]

[D.]

THE CARP AND ITS CULTURE IN RIVERS AND LAKES,
AND ITS INTRODUCTION IN AMERICA.

BY RUDOLPH HESSEL.

[Extracted from the Report of the U. S. Commissioner, Part IV., 1875-1876, pp. 865-900.]

A. — INTRODUCTION.

The present article is intended to give a brief description of the well-known carp of Europe, its nature, way of living, its ratio of natural and artificial increase in open waters, rivers, and lakes, the most approved methods of its culture, and the proper construction of ponds and breeding establishments. An additional object in view is to draw attention to the introduction into the United States of this valuable fish as specially adapted to its needs.

B. — THE RACES OF CARP: THEIR HISTORY AND HABITS.

1. — *The Species and Varieties.*

The carp, *Cyprinus carpio*, of the family *Cyprinidæ*, has a toothless mouth, thick lips, and four barbels on the upper jaw. In place of the usual teeth of the mouth, there are a number of stout teeth on the pharyngeal bones, which are arranged in three rows. It has one single dorsal, which is longer than the anal. Both these fins have at their origin, on the anterior edge, a strong ray, which is serrated in a downward direction. The caudal is of semi-circular shape, and the natatory bladder is divided into two sections, with connecting air-passage. The scales have an entire edge, and the body is compressed on the sides. The general color of the back and sides is a dark olive-brown, the abdomen often of a whitish-yellow or orange tint. The coloring depends, as with all fishes, partly upon the age and season, partly upon the water, the soil, and also upon the food of the fish.

Be it remarked that the carp, which has occasionally been compared to the buffalo-fish, has no resemblance to it, with the exception of the similarity of their coat of scales; neither does the flesh of the buffalo-fish ever come up to the excellence of that of the carp.

The carp was, in all probability, originally introduced into Europe from Central Asia many centuries ago, and is now common in most of the large rivers. In some parts of Europe, principally in Bohemia, Austria, Southern, Central, and Northern Germany, it has become domesticated.

The carp is alleged to have been imported into England in the year 1504. In Austria, which possesses the most extensive carp-fisheries in Europe, the culture of the carp can be traced as far back as the year 1227. The Emperor Charles IV. of Germany, by granting sundry privileges, favored the establishment of ponds in his dominions, and the monks were especially assiduous in the culture of fish in ponds. As early as the first half of the fourteenth century, Bohemia had its first large carp-pond, and the culture of this fish progressed in that country, as also in Poland and that district which now comprises German Austria; also in Upper Lusatia, Saxony, Silesia, and Bavaria. A celebrated establishment for carp-culture, with large, extensive ponds, was located, as early as the fourteenth century, near the town of Wittingau, in Bohemia, Austria. The first beginning of it may be traced back to the year 1367. At that time the lords of Rosenberg called into existence and maintained for centuries these establishments on a scale so extensive that to this day they are the admiration of the visitor, the main parts having survived, while the race of the Rosenbergs has long been extinct.

The manor of Wittingau suffered greatly from the calamities of the Thirty Years' War, and with it, in consequence, its fish-culture. The latter only recovered the effects of it after passing, together with the large estate of a rich monastery of the same name, in the year 1670, into possession of the Princes of Schwarzenberg, their present owners. The extent which carp-culture has reached on these princely domains will be seen from the circumstance that their artificial ponds comprise an area of no less than twenty thousand acres. The proceeds amount to about five hundred thousand pounds of carp per annum. The ponds of the Princes of Schwarzenberg are probably the most extensive of the kind on the globe. They are usually situated in some undulating lowland country, where small valleys have been closed in by gigantic dams for the purpose of forming reservoirs. Similar establishments, though not equally extensive, are found in the provinces of Silesia and Brandenburg; as, for instance, near Breslau and Cottbus, in Peitz and Pleitz, which I visited last year. In Hesse-Cassel, Hanover, Oldenburg, Mecklenburg, and Holstein there are also many hundreds of ponds, none of them covering more than a few acres, but almost every large farm possessing at least one of them.

It will be easily understood that after such an exclusive culture in ponds, continued through centuries, as also an existence in open water, where the *Cyprinidæ* were left more to themselves, a number of varieties or rather genuine species, *Cyprinus carpio*, showing striking differences from the races, were developed: these races, though derived directly from the original type, just as with our domestic animals. They are divided into three chief groups:—

1. *Cyprinus carpio communis*, the scale carp; with regular, concentrically arranged scales, being, in fact, the original species improved.
2. *Cyprinus carpio specularis*, the mirror carp; thus named on account of the extraordinarily large scales which run along the sides of the body in three or four rows, the rest of the body being bare.
3. *Cyprinus carpio coriaceus*, sive *nudus*, the leather carp; which has on

the back either only a few scales or none at all, and possesses a thick, soft skin, which feels velvety to the touch.

The two last named are distinguished from the original form by a somewhat shorter and stouter, but more fleshy, body. It is rather difficult to decide which of these three species is the most suitable for culture. There are some districts where only scale carp are bred and mirror carp are not valued, as there is no demand for any but the former in the market; as, for instance, in Bohemia, in the above-mentioned domain of Wittingau. Again, in other districts, as in parts of Bavaria and Saxony, &c., for the same reason, mirror carp or leather carp only are bred. There is, in fact, no sufficient reason for making any distinction among these three varieties; for, if they are genuine types of their respective species, they are indeed excellent and desirable fish.

The assertion which has been made at times that the scale carp is better adapted for transportation than either the mirror or leather carp by reason of its coat of scales, which would protect it more efficiently from the accidents incidental to transfer, as also against inimical or hurtful attacks in the ponds (the mirror carp having very few and the leather carp no scales), is not correct. In transportation, scales are not only inefficient for protection, but they frequently cause the death of the fish, especially in transporting the so-called breeding-fish; for, if a scale be torn off in part only, ulceration will ensue, and the fish, of course, will die. Again, should any scale be lost, the bare spot will very soon begin to fester or develop a confervaceous growth, and the consequences will be the same. On the contrary, the leather carp, which, oddly enough, like the frog, is destitute of covering, will bear a great deal more ill usage and injury, whether young or old, than the scale carp. The smooth, slippery skin of the leather carp suffers much less from friction during transportation than the scale carp; and any slight wound will heal up much more easily, as the epithelium will cover it immediately, and the formation of a new skin can progress under its protection. I have often had the opportunity of seeing such scars upon the skin of the mirror carp, and even more so on that of the leather carp. They are the effects of an injury from the sharp edges of the heron's bill, the bite of a pike, or some other hurt, and I never saw any thing of the kind on a scale carp; for, if one of these be wounded, it almost invariably dies.

The carp will sometimes cross with some related species of the *Cyprinidæ*,—for instance, *Carassius vulgaris*; and, in consequence, hybrids have been engendered, which sometimes resemble the genuine carp so much that it is often difficult for the student, as well as for the professed culturist and experienced fisherman, to immediately recognize them. Such fishes are valueless as food, on account of their bad and very bony flesh. One of the hybrids mentioned is the *Carpio kollarii*,—*Cyprinus striatus*, which was formerly regarded as a separate species. It is a cross between the carp and *Carassius vulgaris* (crucian carp), a very poor and bony fish, which, in Germany, is sometimes called "poor man's carp." Some varieties exist of this common fish. The latter has even been dignified by a specific name of its own, *Carassius gibelio*.

The spawning seasons of the crucian and the true carp coincide, and,

where kept together, hybrid races may readily be formed; that period including the time from the month of May until August.

In order to determine this question, I myself managed to bring about such crosses by placing (1) female common carp with male crucian carp, and (2) female crucian carp with male common carp, in small tanks, constructed with this end in view; (3) I also put together female *Carpio kollarii* with male common carp, — this for the sole purpose of testing the capability of propagation of the *Carpio kollarii*, which had been doubted. In the two former cases I obtained forms analogous to the *Carpio kollarii*, sometimes approaching in appearance the true carp, at others the crucian carp. In the third case, however, having placed ripe *Carpio kollarii* together with *Cyprinus carpio*, I obtained a product with difficulty to be distinguished from the genuine carp. I took the trouble to feed them for three years, in order to try their fitness for the table; but their flesh was exceedingly poor and very bony, and could not be compared by any means to that of the common carp.

Considering, then, the whole extensive tract of country devoted to fish-culture in Central Europe, where crucian carp are to be found from Italy to Sweden and Norway, from France to the boundaries of Eastern Siberia; considering the many who cultivate on a small scale, and the owners of badly stocked ponds, with their different doubtful productions, — how often do we find in the markets or ponds very nice crosses which have been propagated through from three to ten generations, and which are sold for carp! There are many small sheets of water in Germany, France, Austria, Italy, Holland, and Belgium, and probably also in England, the proprietors of which imagine, in good faith, that they have stocked their ponds with good, genuine carp, which, in reality, through careless selection or ignorance, are hybrids which may even have been cultivated for two or three generations. In some ponds in Switzerland, near the lake of Constance, some crosses of *Abramis brama* were found as late as twenty years ago.

2. — *The Habits and the Mode of Reproduction.*

The carp is partial to stagnant waters, or such as have a not too swift current, with a loamy, muddy bottom, and deep places covered with vegetation. It inhabits now most of the larger and smaller rivers of Europe, particularly the Elbe, Weser, Rhine, Danube, Po, Rhone, Garonne, Loire, then the Bavarian and Swiss lakes, the lake of Constance, &c.; even salt water seems to agree with it very well. I have taken it in the Black Sea, where its weight often amounts to from fifteen to twenty pounds. It is also found in the Caspian Sea in great numbers, and is known there by the name of *Sassan*.

It is an advantage that the carp is able to live in water where other fishes could not possibly exist; for instance, in the pools of bog-meadows or sloughs. However, it is not by any means to be inferred from this that the best locality for carp-ponds of a superior kind could be in such situations. The presence of too much humic acid is unfavorable to the well-being of the carp, as we shall see presently in the chapter upon the establishing of fish-ponds.

The carp lives upon vegetable food as well as upon worms and larvæ of aquatic insects, which it turns up from the mud with the head. It is very easily satisfied, and will not refuse the offal of the kitchen, slaughter-houses, and breweries, or even the excrement of cattle and pigs. I propose to enter further upon the subject of feeding it when I speak of its culture in ponds.

In the moderate zone—that is to say, in Central Europe—the carp will, at the beginning of the cold season, seek deeper water to pass that period in a kind of sleep. This will sometimes occur as early as the beginning of November, if the winter should set in early; and it is to be remarked that they will retire at an earlier period in ponds than in rivers. They do so always in groups of from fifty to a hundred and more. They make a cavity in the muddy ground, called a “kettle:” in this they pass the time until spring, huddled together in concentric circles with their heads together, the posterior part of the body raised and held immovably, scarcely lifting the gills for the process of breathing, and without taking a particle of food. They do not take any food from the beginning of October, and continue to abstain from it, in some countries, until the end of March, and in colder districts even somewhat later. It will not answer, however, to depend on this habit when transporting them for propagation in the spring or winter time, more especially young carp one or two years old. The fish will arrive in a worn and hungry condition, and must be kept in a tank constructed on purpose for observation, where it has no chance to bury itself in the mud: here it will sometimes take a little food. At such times I generally make use of boiled barley, or rye-flour converted into a kind of tough paste by the addition of hot water, and with this I mix a little loam and rye-bread; but I continue the feeding only until I can judge from the looks of the fish that they have recovered. This method I followed with the carp which I imported from Europe for the purpose of breeding in the winter of 1876-77. It is a most striking fact that the carp, though it does not take any food during this winter sleep in its natural retreat, does not diminish in weight, while, in the so-called “winter chambers,” it does so to a remarkable degree. These “winter chambers” are large tanks, a thousand to five thousand square feet in size, or less: they are sometimes walled in with masonry; sometimes they are constructed of wood. Fishes intended for sale are kept in them for a few weeks or months during the winter.

The carp does not grow in the winter. Warmth alone seems to exercise a favorable influence upon it, and to promote growth. It only grows in the months of May, June, July, and August, and does not appear to continue doing so in September. The slight increase in weight which takes place during the latter month seems to grow out of an accumulation of fat which is being deposited around the entrails. In ponds which contain plenty of food and healthy water, in an ordinary year, the growth and increase of weight in the year will be represented in figures as follows:—

| | Per cent of Original Weight. | Per cent of Growth. |
|---------------------|------------------------------|---------------------|
| May | 10-15 | 13 |
| June | 33 | 31 |
| July | 36 | 34 |
| August | 20 | 18 |
| September | 6 | 4 |
| Total | 110 | 100 |

If the weather in the month of May be mild and warm from the beginning, a better growth may be expected, amounting, as in June, to about thirty per centum. This month (May) is decidedly of great importance for the growth of the fish during the current year; for, in proportion as the fish has grown in the short space of one month, it will take more food in the following ones as the increase of its growth and consequent wants will demand. Culturists, therefore, consider the month of May as being the most important of the whole period of the carp's growth. The above-given calculations, of course, are limited to ponds in which no artificial feeding is resorted to, but in which there is sufficient food by reason of the good quality of the water and soil which produces it.

In small ponds, situated in parks or gardens, which possess favorable soil and river-water, the increase of weight will be even a little greater if feeding is had recourse to, for such small ponds (covering only half an acre) cannot produce sufficient food themselves. On the whole, feeding is a makeshift, as will be seen presently, and which in very large ponds of more than from twenty to a thousand acres should not be made use of.

The above calculations are only admissible for Central Europe, from the Adriatic to the Baltic and the North Sea. In countries farther north, as in Sweden, the growth of the carp is less; as, on the contrary, in more southern countries than Central Europe—for instance, in Illyria, Dalmatia, Southern Italy, Southern Spain, and partly, also, Southern France—the result is more favorable still. There a milder and warmer climate, an early spring, a very warm summer and autumn, and a late winter, which, in addition, is mild and short, combine to exercise a favorable influence upon the thriving condition of the fishes.

In these warm climates the fish becomes lively at a much earlier season, if it does at all pass the winter in that lethargic state, without taking any food, than it does in the countries of the northern parts of Central Europe.

The pond carp of Central Europe generally leaves its winter retreat when the rays of the spring sun have warmed the water thoroughly, while at the same time it begins to seek for food at a somewhat earlier period in rivers and lakes. At the beginning of the month of March the eggs have developed themselves considerably in the body of the fish,

and it only needs a few weeks of warm weather to bring about the spawning season. This commences in the middle of May in such lakes and ponds of Central and Northern France, Southern Germany, and Austria as have a warm situation and are sheltered from the cold winds. It continues in some localities throughout June and July, and sometimes, in more elevated situations, until August; as, for instance, in Franconia and Upper Bavaria. The spawn of so late a season, however, is scarcely fit for breeding purposes, as the fish cannot grow much more during the short space of warm weather. It remains very small, and suffers greatly from the ensuing winter weather, and is easily dwarfed at that time. The spawning of the individual fish does not take place all at once. Days and weeks may pass before it will have left the last egg to the care of nature. At times, upon the setting-in of rainy, cool weather during this period, it will be interrupted, but re-assumed as soon as the temperature grows warmer again. Culturists altogether dislike cold weather at this time, as not only the eggs, but the young fry also, suffer much from it. Wet, cold summers are no more profitable to the culturist of carp than to the agriculturist. In the southern part of Europe the spawning season commences at an earlier date than in Central Europe. In Sicily, in the neighborhood of Palermo, where there are some private ponds, the carp begins to spawn at the commencement of the month of April. This is said to be the case also in the French province of Constantine, Algeria, Africa.

The abundance of eggs in the carp is very great, and it is this circumstance which will explain its extraordinary increase in the natural waters. A fish, weighing from four to five pounds, contains, on an average, four hundred thousand to five hundred thousand eggs. Other statements figure still higher. I not only made calculations myself formerly, repeating them in 1876 on a female mirror carp, which I obtained from the environs of Gunzenhausen, Bavaria, and which, curiously enough, at the end of November, was entirely ripe, but I also obtained statements from culturists on whom I could depend. The calculation I made in the following manner: after freeing the eggs from all the fat and the enclosing membrane, and after having washed them in alcohol, I counted off exactly a thousand of them; these I weighed, and according to the result I deduced the number of the whole. In the somewhat longer-bodied scale carp, I generally found comparatively more eggs than in a mirror or leather carp, though all were of equal age and weight.

During the spawning season an appreciable change takes place in the male; protuberances, like warts, appearing on the skin of the head and back, and disappearing upon the expiration of that period. This is a peculiarity with most of the cyprinoids. Some time before the spawning season sets in, the falling out of the pharyngeal teeth takes place: these grow anew every year.

Some days before spawning, the fish show an increased vivacity: they rise more often from the depths below to the surface. Two or three or more of the male fish keep near the female: the latter swims more swiftly on a warm, sunny morning, keeping mostly close to the surface, followed by the males. This is called "*streichen*," — running-spawning,

and is more frequent in warm than in windy and rainy weather. The female prefers spots which are overgrown with grasses and other kinds of aquatic plants, such as *Utricularia*, *Nymphæa*, and *Alisma*. The male fishes follow close to the very water's edge, as far as the diminished depth will allow them. They lose all their timidity and precaution, so that they may be taken quite easily. They lash the water in a lively way, twisting the posterior portion of the body energetically, and shooting through the water near its surface with short, tremulous movements of the fins. They do so in groups of two or three males to one female fish, and forming an almost compact mass. This is the moment when the female drops the eggs, which immediately are impregnated by the milt. As this process is repeated several times, the female drops probably only from four hundred to five hundred eggs at a time, in order to gain resting time, so that it will require days and weeks before it has given up the last egg.

The eggs of the carp are adhesive, not detached, like those of the *Salmonidæ*; these latter lying loosely on the ground, while the former adhere in lumps to the object upon which they have fallen. As soon as the egg has left the body of the fish, it swells up a little, the mucus, which surrounds it, serving as a means to fasten itself upon some aquatic plant, stone, or brushwood. Those eggs which have no such object to cling to are lost. I found numerous eggs on the reverse sides of the leaves of the *Nymphæacea* and their stems, the *Phellandrium*, and *Utricularia*; but the greater number of them I discovered on the *Festuca fluitans*, which, among fishermen, is known generally by the name of "water-grass." Its narrow, long, strap-shaped, thin leaves spread softly over the water's surface, as also its numerous branches in the water afford to the fish the sought-for opportunity to deposit its eggs upon its tender leaves. The seeds of this grass are an excellent food for the carp. This may be regarded as a useful indication to be acted upon in the construction of ponds.

The eggs will develop themselves quickly, if assisted by warm weather. As early as the fifth or sixth day the first traces of dusky spots, the eyes, will be visible, and toward the twelfth, or at the latest the sixteenth, day the little embryo fish will break through its envelope. This rapid development takes place only in shallow, thoroughly warmed ponds, or in such as were expressly constructed for hatching, and called breeding-ponds. If these ponds are deep, and consequently their water is colder, the hatching process may require as many as twenty days. In from three to five days the young fish has absorbed the yolks, and seeks its food. If the breeding-pond be productive enough to furnish the necessary food for so many young fishes, these will grow very rapidly. I shall return to this subject hereafter.

I remarked above that the carp prefers stagnant or slowly running water with a muddy bottom, and that it lives upon vegetable as well as animal food, aquatic plants, seeds, worms, and larvæ of water-insects: it is therefore no fish of prey. It does not attack other fishes, and has no teeth in its mouth, but only in the throat, and is, on account of its harmlessness, an excellent fish for the culturist, as well as for stocking large lakes and rivers in general.

3. — *The Growth and Size.*

Its growth differs according as the fish inhabits cold or warm water, a river, lake, or pond, finding plentiful food therein, or being fed. An additional factor is the quality of the soil, whether muddy or stony. In cold water, or such as has a stony ground, the carp will not progress favorably. For this reason the statements concerning its normal size, attained to in a certain given time, differ widely. Very naturally it will exercise an extremely great influence upon the thriving of the fishes, whether the pond contains a great number or only a few of them; whether it is overstocked, as culturists term it; or whether there are only a proportionate number of fishes in it, according to its capability of producing food. Other considerations remain to be mentioned; namely, is the pond provided with supplies from brooks falling into it, or are the fishes to be fed? The latter course is almost indispensable in the culture of trout. The expenses incurred in this case diminish the income of the culturist: if not resorted to, the result will be the same, as the value of the fish will be smaller. This feeding is needless with the carp, if it be cultivated judiciously in suitable ponds; and for this reason alone the culture of the carp is preferable to that of the trout.

In rivers and lakes it grows larger, although the same fish, for the reason, probably, that in a larger space, which at the same time yields more sheltered retreats, it escapes from the pursuit of man more easily than in regular artificial ponds, and finds more plentiful supplies of food. The question of the species, or I would rather say the race, is of great moment, particularly in respect to carp-culture in ponds.

A favorable result may be expected from the culture of this fish wherever the necessary water is to be found, be it in the North or South, and that, too, as well in ponds as in open lakes and rivers.

The normal weight which a carp may attain to in three years, whether it be scale carp, mirror carp, or leather carp, is an average of from three to three and one-fourth pounds; that is, a fish which has lived two summers — consequently is eighteen months old — will weigh two and three-fourths to three and one-fourth pounds the year following. The growth may turn out to be even more favorable in a warm year, or if only a few fishes have been placed in a pond, as we shall see farther on in the chapter treating of pond-culture and the operations of the culturist.

Carps may reach a very advanced age, as specimens are to be found in Austria over one hundred and forty years old.

The increase in length only continues up to a certain age; but its circumference will increase up to its thirty-fifth year.

I have seen some common carp in the southern parts of Europe — in the lowlands of Hungary, Servia, Croatia, Wallachia, as also in Moldavia and the Buckowina — which weighed from thirty to forty pounds and more, measuring nearly three and one-half feet in length by two and three-fourths feet in circumference.

Old men, whose credibility and truthfulness could not be doubted, assured me, and gave the most detailed accounts, of the capture of this species of fish in former years, giants, which weighed from fifty to sixty

pounds, and which they had seen themselves. During the Crimean war, in 1853, a French engineer officer, stationed at Widdin, on the Danube, in Turkey, killed a carp by a bullet-shot some distance below the city: this fish weighed sixty-seven pounds. I had some of its scales in my possession, of which each had a diameter of two and one-half inches. Their structure indicated to a certainty that the age of this fish could be no more than twenty-four years at the most. It is a well-known fact that two large carps, weighing from forty-two to fifty-five pounds, were taken several years ago on one of the Grand Duke of Oldenburg's domains in Northern Germany. They had been kept in some particularly favorable water, productive of plentiful food, and had been used as breeding-fishes. These two specimens might, from their size, be calculated to be comparatively very aged fishes: it was proved that they were only fifteen years old. If we may credit the chronicles kept centuries ago by old families, and especially by the monks, who had taken possession of all the best localities along the banks of the beautiful blue Danube, then still greater giants had been caught, and that in the waters of the Danube itself. A chronicle of the monastery of Mlk, in Austria, refers to a carp weighing seventy-eight pounds, which had been captured on Ascension Day in 1520. Another record speaks of a carp which had been taken in the third decennium of the present century in the lake of Zug, in Switzerland, and which weighed ninety pounds. These giants are certainly only wonderful exceptions, and have become celebrated through the scarcity of such occurrences; but still these facts are encouraging illustrations that it is possible for such large specimens to grow up in favorable water. All the countries where these large fishes have been found, and which are situated between the Black, the North, and the Baltic Seas, are pretty nearly such as have a late spring and a long, cold winter. Near Widdin the Danube has been frozen repeatedly. There the carp passes from five to seven months in its winter sleep, during which it does not grow. If this fish thrives so well in the countries which have such a very cold winter (on an average they have the same winter temperature as Boston, Chicago, Milwaukee, Pittsburg, Philadelphia, New York, Baltimore, and St. Louis), where the rivers have not enough food for these fishes by far, their level being regulated by dams, which are a subject of constant complaint to the fishermen, how much more would they thrive in the waters of this country with their great riches of food! But, if we take into account the rivers of the mild south and south-west of the United States, what success may not be expected for this fish in those regions?

If the carp finds food in superfluity, it will grow much more rapidly than the above statement indicates. This gives an increase of from three to three and one-fourth pounds in one year and six months; but this is only the normal one, the food consumed being of an average amount. If the fish obtain food very plentifully, it will grow more rapidly. In this case, again, it is to be considered that the waters of the milder climates of this country possess this advantage, scarcely to be judged of or estimated at its proper value as yet, that the fish may be able, during three-quarters of the year or even the whole year round, to take food, and will

omit the lethargic winter sleep conditioned by the cold winter. There is scarcely a comparison to be made so far as the carp are concerned between the rivers of this country, so richly supplied with food, which it will not be compelled to seek for it under a constant strife for existence, and those of the much poorer waters of the Rhine, Elbe, Rhone, &c. In the waters of its native country, in Central Europe, after its first wakening from the long winter sleep, it seeks most diligently after the contents of the seeds of the *Nuphar luteum* and *Nymphaea alba*, the yellow and white water-lily, the *Phellandrium aquaticum*, *Festuca fluviatilis*, &c. The waters of the United States abound in all these plants and numerous others, the seeds of which will serve the fish as food; for instance, the wild rice (*Zizania aquatica* and *Z. fluviatilis*), the well-known Tuscarora rice or "water-oats" with its great riches of seeds, and many others, which will yield food profusely, and which European waters do not possess, thus giving a great advantage to the American carp-culturist. And then there is the culture of fish in ponds. There are culturists in Central Europe who, wishing to see the fish growing more rapidly, take the trouble to feed them with soaked barley, which they occasionally throw out in different places; and, by doing so, they have had a very full success, the fish growing larger, that is, more quickly, when not thus fed. By introducing the above-named wild or natural water-plants in carp-ponds, they will be perpetuated; and the grains which have fallen to the bottom of the water will form an ample article of food for the first spring days, if we do not prefer to give them the almost worthless offal of the slaughter-houses. I do not advocate the so-called artificial feeding of this fish where the ponds themselves yield food in ample abundance, a consummation toward which the Tuscarora rice will largely contribute.

Let us once more consider the fact of its extraordinary increase of weight of about a hundred and ten per centum in the exceedingly short space of four months; for during the cold winter time, when ice thickly covers rivers and lakes, nature banishes it into its temporary tomb, which it chooses and digs for itself, to hold its winter sleep in. This fish needs from fifteen to eighteen months of growth, to gain, according to a low estimation, the weight of three pounds without being fed. But much more satisfactory results are frequently arrived at when favorable circumstances combine, and when it will reach a greater weight. There are some culturists who obtain in the space of time fishes of four pounds' weight: of course they possess warmly situated ponds, which thaw very early in spring, and perhaps they assist nature in some degree by feeding the fishes. I have done so myself in two successive years, which were exceptionally warm, when I fed the fishes with the almost worthless malt-refuse, or "grains." They increased visibly, and attained to the above-mentioned weight in the same space of time.

This fifteen to eighteen months of the actual time of growth transpires during a period of three years and six months, as intervening months of winter sleep are to be included, during which the growth is interrupted.

I will not recur to what this fish promises to become in the milder regions of the south, where neither ice-bound water nor cold temperatures force upon it the lethargy of the winter sleep; where it will have

the longer space of from eight to ten months, or maybe the whole year, including the mild winter, for the most vigorous and rapid development, — not, as in Europe, the sparingly allotted four or five months.

It is not to be doubted that the carp will arrive at the weight of from two and three-fourths to four pounds in one year in those warm climates, when in colder regions it requires two years and six months. I do not think that I am mistaken in this: I am ready to stand by this assertion, which the future will surely verify.

I believe I have said all that is most desirable for the culturist to know concerning the carp and its natural history; and I will now treat briefly of its culture in ponds, rivers, and lakes, as also the construction of ponds.

C. — THE CULTURE OF CARP AND CONSTRUCTION OF PONDS.

1. — *Its Adaptability to Artificial Culture.*

The conclusion from what has been said will be, that the carp is excellently qualified for culture in enclosed waters, as artificial ponds, and also for the stocking of open waters, such as rivers and lakes, for what is called “free fishing.”

It is in the power of the culturist to produce, by means of artificial impregnations and hatching, as also by the natural increase of this fish, with its abundance of eggs, any amount of fry, as well for fresh water as most probably also for salt water, as the fact of its occurring in the salt water of the Black, and very frequently in that of the Adriatic Sea, will demonstrate.

There is no other fish which will, with proper management, be as advantageous as the carp. Its frugality in regard to its food, its easy adaptability to all waters, in rivers, in lakes and ponds, and even salt-water estuaries, its regular, rapid growth, and its value as a food-fish, are its best recommendations.

2. — *The Localities best adapted to a Carp-Pond.*

I will try to describe, in the first place, the manner in which carp-culture in ponds is conducted in Central Europe, and subsequently explain more fully its introduction in open waters.

If intending to establish carp-ponds, it will be necessary to ascertain the following points before the execution of the plan: —

1. Is there a sufficient quantity of water at hand for all purposes, for the summer as well as winter?

2. Is the ground, soil, and water favorable for culture?

3. It is important to examine the land minutely, in order to find what are the components of the soil, for not every kind of soil is suitable for carp-culture.

4. It ought to be decided from the commencement how large the establishment is intended to be, whether only for private use and pleasure, or whether wholesale production of the fish as an article of trade is contemplated.

If points 1 and 2 have been satisfactorily settled, then the ground

must be examined, particularly whether it is so constituted as not to allow the collected water to penetrate, and whether the ground is sandy or loamy. Above all, it must not be neglected to measure the depth of the stratum which holds the water, and to be fully assured that it is sufficiently impermeable to withstand the pressure of the water and to hinder its oozing through, so as to prevent the consequent drying-up of the pond.

A rocky, gravelly ground is not appropriate for carp-culture. Sandy ground, without a considerable mixture of loam, clay, and humus, is of small use. I speak here of large ponds of considerable extent. Small ponds with a sandy bottom may be improved by supplying them with loam, as it is frequently done in agriculture.

Loam is a mixture of a small per centum of sand and a larger quantity of clay, and is suitable for ponds. If such ground contains some marl, or, better, some little elements of humus, it is of the greatest advantage for fish-culture. These constituents of humus, if dissolved, give the water a yellow, muddy color; and this water supports by its ingredients a profuse number of microscopic beings, which again form the support of a larger class of creatures, and represent therefore the productiveness of food of the pond, on which, in its turn, the carp depends for its sustenance. Too much humus or dissolved peat is injurious. Water which runs through bog-meadows or oak-woods is not of much use, because it contains too much humic acid and tannin: these impart a mouldy taste to the fish. A too considerable amount of gypsiferous earth, carbonate of lime, or sulphate of lime, is injurious also. Should any mineral springs fall into a pond, they must be turned off. The most favorable water will always be that which comes from rivers and brooks. Ponds might be constructed which would fill themselves with rain-water during the winter or at any other time; but such water takes a mouldy taste easily, which it will communicate to the fishes, as does the water from bogs also.

In Europe experience has shown that water coming from fertile fields and meadows, carrying with it particles of offal from villages, is best adapted for carp-culture.

Spring-water direct from the ground is not favorable, and ought to be conducted for at least a few hundred yards through wide, shallow ditches, in order to receive more nourishing components from the air as well as the earth, and above all to be warmed to some extent by the sun and warm air.

A tract of land, such as above described, merits the preference as a site for a pond, if in other particulars the ground is favorable and has not too great a fall. If this were the case, very high and strong dams would be required for the collection of water. Such dams cost large sums if constructed of good water-proof material.

A low, undulating country, with only slight elevations or hills, where the small valleys are easily closed up by dams for the purpose of forming reservoirs, is favorable, the construction of these dams involving comparatively trifling expense.

3. — *The Construction of the Ponds.*

Ponds must not be too deep, as the water will be colder and will harbor fewer insects, larvæ, and worms, which form part of the carp's food: besides, this fish does not grow quickly in cold water. A depth of three feet in the centre of the pond is sufficient; toward the outlet-sluice it may be from six to eight feet deep, but only for an area of from two hundred to one thousand square feet. In the depths of this "collector" the fishes seek their resting-place for the winter, and also in summer, when the water is too warm near the edge. The outer part of the pond should not be deeper than one foot for the distance of about seventy or a hundred feet, so that the water there may be warmed more thoroughly by the sun.

Toward the centre of the pond, and in accordance with its size, a cavity of from twenty to fifty feet in length, and two feet deeper than the rest of the ground, should be dug. This will serve the fishes for a resting-place in summer and winter. This cavity is sometimes called a "kettle," though the appellation varies in different localities.

From the entrance of the pond to the other end, where the "collector" and the outlet-sluice are situated, two or three ditches of two feet in depth and four feet in length must be made, which cut the deeper "kettles" transversely as far as the collector. These ditches are intended to carry all the fishes into the collector when the pond is being drained. The collector is nothing but a place of from twenty to forty feet in length and breadth near the outlet-sluice, one foot deeper than the remaining bottom of the pond. In ponds of superior construction it has generally a wood flooring, and must be cleaned of the mud every year, so that the fishes may not become too much soiled by the mud.

In speaking of the erection of a breeding establishment for carp, I have in view a water-extent of at least thirty-five to seventy acres' area, which in Central Europe would be considered an establishment of about one-third magnitude.

The inflow of water into the pond should never be allowed to be direct; as, for instance, a brook falling into it. This often causes the water to rise at an inopportune time, carrying into the pond other fishes, especially the rapacious pike. The carp also has the disposition to swim toward the inflowing water, by which means it is drawn away from its proper feeding-places. The water should be conducted into the pond sideways from the stream; and, if it should be a small brook only, it may be turned off entirely, and carried alongside the pond, from which point the latter can be easily supplied with water.

The inlet-sluices from the stream must of course be of a strong and practical construction, so that an overflow is impossible; and they ought to be provided with gratings to prevent other fishes from intruding.

It is an indispensable condition for the culture in ponds, according to established rules, that they be so constructed as to allow of being thoroughly drained, so that the fishes may be taken out without any difficulty. The bottom of ponds should be of such a description as to permit their being dried up for agricultural purposes if necessary.

In Europe ponds of from ten to two thousand acres' extent are frequently to be found, which, after having been used for fish-culture for a time, are dried up; and sometimes grass, oats, wheat, &c., are planted on the ground. This improves the soil exceedingly for fish-culture. I mention this simply in order to show that the soil gains by this manipulation, not only for fish-culture, but also for agriculture. If the soil at the bottom of ponds has been freed from the humic acid by vegetation, after being ploughed and exposed to the air thoroughly, fishes will thrive incredibly well in them. This I intend as a suggestion particularly for farmers who would wish to establish a small pond of perhaps five or six acres' size, to show that the soil of their land would not lose, but rather gain, by doing so. Agriculture and carp-culture go hand in hand in some Central European countries, and form a kind of complement to one another. To-day a piece of ground may be a field or fertile meadow; next year it will be found to be a productive pond, to serve again one or two years later its first purpose.

If the size of the principal and supplementary ponds has been decided on, the height, depth, and width must be measured, and the levels of the ground and dams, if such are needed, should be carefully taken. The levelling of the bottom is required to assist in the determination of the depth of the ditches, "kettles," collector, and outlet to be dug in it.

In the erection of the required dam it is most important that it be constructed of the very best material, so as to make it secure against the destructive influence of the water. It ought to be three times as wide at its base as it is high, and at the top the width should be the same as the height. The interior, or water-side, should be less inclined than the exterior one.

Before the foundation of the dam is laid, the ground where it is to stand must be dug out to a depth of two, and a width of from four to five, feet throughout the whole length of it. If the ground does not consist of loam, it must be filled up with it about one foot deep, and this must be tamped down hard. A second layer follows, and is disposed of in the same manner. This is repeated, the clay being moistened every time if required, and then beaten down solidly. This lower stratum is but the foundation of the dam, which is formed from the earth dug out of the pond or its vicinity. This is continued until the dam is completed. Care must be taken, however, that the construction and tamping-down of this lower stratum be done in layers, and that nothing but good clay be used. In this manner the material of the foundation will become a very tenacious mass, which will not allow any water to penetrate. The completion of this laborious task will be a source of ultimate satisfaction, as many disadvantages, which might arise after the filling of the pond, will be done away with through its agency. The dam should not be made entirely of clay; for in midsummer, during the great heat, it would dry out too much on that side most exposed to the sun, and consequently it would become full of fissures, through which the water would escape, and this might become disastrous for the establishment.

On account of the required outlet-sluiques, &c., the fact must be kept in view, that such newly constructed dams will sink ten per cent after a

lapse of time of little more than a year, with the exception of that portion which has been solidly made. The dam should be sodded. For the draining of the pond, at the "fishing-out" season, it should have an outlet at the lower end, if no other advantageous arrangements can be made for the purpose. The use of wood-work for the channel should be avoided, its durability not being sufficient. The most desirable construction would be that the outlet-channel consist either of masonry-work or water-pipes, which may be made either of clay or iron. This channel or pipe must be so made that it can be closed tightly or opened again readily if needed, and must be provided with two or three fold gratings to prevent the escape of the fishes upon the opening of the sluice. At the same time there should be an outlet-channel, several feet in breadth, at the side of the pond, to allow the water to run off. This must also be secured by grating, but should be kept open always, so that, in case of continued rainy weather or sudden and violent showers of rain or thunderstorms, no overflowing of the banks or dams may be possible through the unexpected rising of the water in the pond. Large fish-ponds of several hundred acres' extent (some have a surface of twelve hundred, fifteen hundred, or two thousand acres) have generally, and according to their size, two or three outlets I have described, and which pass underneath the dam. The outflow from these is usually regulated by adjustment of the flood-gates from the top of the dam.

The so-called "Mönche" (monks) are wooden boxes, which stand in the pond at a distance of a few feet from the dam. They are perforated like a sieve, or are provided with small adjustable boards, and wooden pipes run from them through the dam. In Bohemia they are called "carp-houses." They are, however, rarely used in large establishments at present, only such culturists making use of them who have but small breeding-ponds at their command and carry on culture on a small scale. These locks suffer too much from the water, air, and sun, as also from the pressure of the ice in winter, so that they require considerable repairs at an early date after their first coming into use; but they serve their purpose fully in small ponds, especially in smaller ponds, which are intended for pleasure or experiment.

There are so many different ways of constructing these subterranean sewers, that I may as well pass them over: they belong more particularly to the department of hydraulics. It is the province of the culturist to find for himself that which will be the best and most practical method in the construction of outlets.

If it be desired to make use of natural ponds, of which there are numbers in every State of the Union, it is necessary to ascertain whether they can be put into the proper condition for regular culture. This can only be done if the influx of water can be regulated and the entire drainage of the pond made possible. An intrenchment will be required with such ponds in order to make them dry. Trunks of trees should be taken out of them; and where they are too deep they should be filled up, or, if this cannot be done, they should be brought into connection with the above-described sewers on the bottom of the pond. If this is not done, too many fishes will remain embedded in the mud when the pond is being drained, and this lessens the profits to a great extent.

Should any brooks fall into such ponds, as is often the case with large ones, they must be kept under strict observation on account of possible overflows which might occur. If it be practicable, the brook had best be turned off and conducted alongside the pond, when the latter can be supplied with water if required.

Such brooks, coming from a neighboring hilly territory or from mountains, will frequently occasion an overflow if either a thunder-shower or sudden thawing of snow and ice should set in. In the latter case the ground might be too hard with the frost to allow the water to run off readily.

If the overflow should even be inconsiderable, it would still exercise an injurious influence upon the fishes, as the influx of so much water, which in all probability would contain unfavorable substances, would be apt to drive them from their winter retreat.

In summer, sudden, violent rain-showers may cause an overflow within a few minutes, which will carry off the fishes, and eventually may destroy all the ponds. To secure against this, the construction of reserve-sluices, such as are contrived in artificial ponds, and a wide reserve-ditch alongside the pond, which is destined to carry off the threatening high water, are recommended. A small dam between the pond and brook, instead of the reserve-ditch, will sometimes answer.

Great caution is necessary in the selection of the site for a pond or the natural pond, which is to be converted into a carp-pond.

Overflows not only injure the ponds and fishes, but may result in a still worse disaster; — that of carrying away the fishes into strange waters and destroying the ponds.

The fundamental rule in carp-culture is, that the water be of the same depth in summer and winter. If the supply of water is too plentiful, great quantities of mud are carried into the pond, embedding the grass which grows in it and on its banks: this, in consequence, will rot and poison the water. The carp immediately desert such water on account of its offensive odor, and retire from their proper feeding-places to depths deficient in production of food.

The mud, which is being constantly reproduced, consists of the remainders of plants. From these, different gaseous compounds develop themselves in midsummer, and the fishes become sickly in consequence. In this case, especially if they rise to the surface seeking for air, more water must be supplied through the inlet-sluice, when they will recover by degrees. A casualty of this description may occur in very large ponds, though no overflow may have taken place.

Pernicious gases develop themselves from the mud even in winter; but they rarely have any bad effects, being injurious only if the water is covered by ice, when the fishes die from suffocation. For this reason large apertures are cut into the ice for the supply of fresh air.

4. — *Stocking the Ponds, and Care of the Fishes.*

To carry on carp-culture in a regular and judicious manner, several ponds are required, according to the various purposes they are destined for.

1. The hatching-pond.
2. The breeding-pond.
3. The culture or regular carp pond.

The hatching-pond serves more particularly for natural impregnation and hatching, or rather for natural propagation generally, by placing a number of male and female fishes into the pond. Here the females drop the eggs, during the spawning season, upon aquatic plants, where they are impregnated by the male.

In stocking ponds, three females are calculated to two males, sometimes twice that number, per acre. The females bear a great number of eggs, as has been remarked before; but the smaller number only are impregnated: neither do all these come to life.

The most liberal estimate will not exceed the number of from eight hundred to one thousand young fishes to one spawner; the aggregate per acre amounting to from four thousand to five thousand.

It is scarcely possible to say what is the most desirable number of milters and spawners for stocking ponds, as the views on this subject differ widely in Europe. I believe, however, the above to be correct, and it is accepted as such by all extensive establishments.

The above-mentioned result will be much more favorable if the old rule, now unfortunately almost forgotten, is observed, — to feed the carp which are in the spawning-pond, shortly before and during the season of spawning, so as to prevent their searching for food, which generally leads them to eat their own eggs. After the fish have laid their eggs, they must simply be removed from the ponds, which prevents their eating the eggs. This useful rule, formerly much practised in Europe, has unfortunately fallen into disuse: in fact, it has almost been forgotten, probably because carp naturally increase very fast.¹ By removing the spawners, three times as many young fish are kept alive than by leaving them in the spawning-ponds. On no account should too great a quantity of young fish be placed in a pond. The above-mentioned number of four thousand to five thousand young fish to the acre requires water which is very rich in natural food. If there are too many young fish in the spawning-pond, they grow very slowly, as the pond cannot produce the

¹ In Germany this rule is only observed by some small pisciculturists; in France, on some of the former lordly manors, — in the department of the “Seine inférieure” and in the department of the “Rhône,” — where they likewise had the custom to plant aquatic plants (*Utricularia*, *Phellandrium*, &c.) in loosely plaited baskets, which, when covered with the impregnated eggs, were transferred to other ponds. Duhamel also practised this in his time. This practice has doubtless led Dr. Lamy of Rouen to his artificial spawning-places made of reeds. By an order of the Abbot of the Benedictine Convent of Kremsmünster, in Upper Austria (founded in 777), of the year 1529, the fishers of the convent domain were reminded that spawning-carps must be of a certain age and size, and must consequently be weighed. After spawning, they had to be removed from the pond. This convent is still in existence, and is the wealthiest convent of the Austrian monarchy, owning upwards of one hundred and fifty large villages, and possessing a large and valuable library and observatory and scientific collections. But the order of the good old abbot is no longer observed. Similar orders were, in former centuries, also given by other convents in Austria, as Lambach, in Upper Austria, Wellehrad, in Moravia, and others. The fishermen’s guilds of Nuremberg and Bamberg had, about the year 1600, similar rules, which were placarded in their guild-halls, and which were strictly observed. At present such rules are not known in either place.

necessary quantity of food. Such fish are scarcely one to two inches long when they are one to two years old: only the head grows a little, whilst the rest of the body remains small. As soon as young fish feel the want of food for any length of time, the gristle and bone of the skeleton harden, thus bringing its development to a close, not allowing nature fair play, and the fish remains a cripple for the rest of its life, even if it is placed in ponds affording unlimited supply of food. It is therefore better either to place fewer young fish in the ponds or to make the ponds larger: it will be found to pay. The young fish will grow rapidly; their development will be healthy, and even during the first year they will reach the length of five to six inches. Strong and healthy fish can thus be placed in the growing-ponds, and here, too, they will grow rapidly. If there are too many young fish for the water-area, it is better to place them in some lake, brook, or river. On no account should they be kept in the pond. Beginners in carp-culture usually consider it quite a sacrifice to let so many young fish loose in the open river or lake: they keep them, and later they will bitterly regret their parsimony, or rather their imprudence, by having weak or not fully developed fish.

The hatching-pond should not be as large as the breeding-pond; its depth not to exceed one or one and a half feet. The outer portion, or, as it is termed, the low-water margin, should generally be from two to five inches in depth, and from thirty to forty feet in width. Provision should be made that *Festuca fluitans* grows there plentifully; for the fishes give the preference to this plant for the deposition of eggs, as I before observed. But the bottom of these hatching-ponds must be of similar construction to that of the larger ones; that is, they must be provided with the above-described cavities, or kettles, collectors, and collector-ditches. The "collectors" must be cleaned from the mud every spring: they need not be as deep in these ponds as they are in such as are intended for the reception of larger fishes; a depth of from four to five inches only being required for fishes of minor size. The hatching-ponds have outlets and reserve-sluiques in the dam, at the lower end or on the sides, to guard against overflows. These ponds must be secured against the intrusion of pike, eels, bass, cat-fish, tritons, water-snakes, turtles and water-lizards, rats and water-fowls, or any voracious animals, and, in the South, the alligator. A fine grating will prevent the entrance of the former: against the latter various traps are in use, and other means might be devised. It is of the highest importance that new ponds be assiduously kept clear of the animals mentioned, and of many others not named here.

In small establishments, embracing only a few acres, it will be found advantageous, in spite of the somewhat greater expense, if the ponds (both natural and artificial), either all or singly, are surrounded by a very close board fence, three to four feet high, and going four to six inches into the ground. Such a fence will afford no protection against aquatic birds, water-snakes, and muskrats; but it will exclude the snapping-turtle, the most dangerous and voracious enemy of fish, which is more to be feared than either cranes or otters. This detestable animal has been known to clean a pond of fish, and then, led by its sense of

smell, to follow the fish, going even up hill and against the stream. At night it seizes the fish, which, not suspecting any danger, rest at the bottom, with its sharp fangs, resembling shears, and kills them. It is a peculiarity of carp to keep at the bottom during the night, and likewise during cold and gloomy weather; and the snapping-turtle would therefore have many an opportunity of destroying them. Large iron fish-hooks, with a piece of meat fastened to them as bait, will do good service, if distributed in suitable places on the banks. This should be done from spring to October. The pieces of meat should be of such a size that even large carps cannot bite them: they will then form a most attractive bait for the ugly monsters. These hooks should be fastened with a strong brass wire, as the snapping-turtle could easily bite through twine, and should be inspected every day.

In placing spawners in ponds, great caution must be practised in their selection, so that only really healthy fishes may be introduced, and not such as are affected by fungous growths, the gelatinous polyp, or other disease. In Europe the polyp, in particular, has frequently destroyed the productiveness of ponds for many years.

The newly obtained young fry are left in the hatching-ponds during the winter, after which they are to be transferred to the larger ponds.

The catching of the young fishes must be done with great care, and the water must be drained off through the grated outlets very slowly, so that no fishes may remain in the mud; for, if a new hatching operation is contemplated in the pond, the newly hatched fishes will be retarded in their growth on account of the scarcity of food, this being consumed by any remaining larger ones. The young fishes must be handled carefully; for the slightest injury of the scales may cause disease and death.

The breeding-ponds have the same construction as the hatching-ponds; they have dams, reserve-sluiques, outlet-channels, collectors, and ditches in the bottom. The only difference is in being deeper and larger than hatching-ponds. They have an average depth of one foot and nine inches, and the width of their shallow borders is from seventy to eighty feet. The "kettles" have a depth of four and one-half feet from the surface: their borders are from six to eight inches deep. The growth of grass should also be advanced in these ponds. In small ones of about four or six acres, the "kettles" may have a length and width of sixty or seventy feet.

The stocking of the breeding-ponds takes place in spring, immediately after the emptying-out of the hatching-ponds: it lasts from the latter part of March until April.

From eight hundred to one thousand breeding-fishes may be calculated to an American acre, eight hundred being the average. To cover possible risks, one hundred more may be added, as in the most successful pond slight losses are to be expected.

In favorable ponds, where the carp is left to seek its food, it will have gained a weight of about one and one-fourth pounds in the ensuing autumn. In small ponds, about one acre in size, where feeding is practised, they will weigh more.

In the southern countries of Europe, in favorably situated ponds, they

will sometimes reach a weight of two pounds in the same space of time. This I found to be the case in Southern France. However, these favorable results are only attributable to the mildness of the climate, and I doubt not that proportionably better results may be arrived at in the south of this country.

In ponds of small capacity, in which nourishing food is produced in small quantities, the results of breeding are not very encouraging.

An advantage will be gained in northern, colder countries, by leaving the young fishes two summers in the breeding-ponds; that is, they are transferred to a second, larger one, and only from this they pass into the culture or real carp ponds. This will answer especially well if the bottom of the pond is poor, or if feeding has not the desired effect.

This method is followed by many competent culturists in Germany and Austria, who, in the possession of extensive lands and excellent numerous ponds, find it to their advantage, as it enables them to place larger breeding-fishes in the carp-ponds; and, though this is done a whole year later, the loss of time is compensated for by the large size of the fishes produced in the carp-ponds.

In the spring of the third year those fishes which have been one year in the breeding-pond are transferred to the carp-ponds, the construction of which I have described before. Fishes having been kept in the breeding-pond for one summer only, without being fed, will be found to weigh at the expiration of that time from one to one and one-fourth pounds, while those which remained there two summers will show a proportionally greater increase of weight. In Southern Hungary and Croatia the fishes kept in the breeding-ponds but one summer occasionally thrive more favorably. Differences in the ratio of weight are commonly owing, as I observed before, to climatic influence; and the greatest and most rapid increase will be found in localities where there is an early spring and where the months of September and October are warm, but particularly where the nights are still and mild during spring and autumn.

Breeding-ponds should have a certain number of fishes only placed in them when they are stocked, and that number should never be exceeded. For the culturist it is important to bear in mind, that, the younger the transferable breeding-fishes are, the less expense they will have caused, and the sooner their money-value may be realized; all carps weighing two and one-half pounds and more being for the market.

To stock a culture-pond of one acre, four hundred to five hundred carp of one pound in weight will be required; and in the following year, or rather in the autumn of the same year, when the fishes are taken out for the market, they will weigh in a good pond two and three-fourths to three pounds each, or about twelve hundred to two thousand pounds in the aggregate. In some localities only two hundred carp are taken to one acre of American square measure; in other places, more.

Pike¹ are frequently put into carp-ponds in Europe without reducing the number of the carp, one pike being added to twenty-five or thirty of the former. This is an old practice, which has been proved of great use

¹ Males are selected for this purpose.

by experience, assisting through the effects exercised in the improvement of culture; that is, the favorable progress of the fishes. The carp is a very indolent fish, which frequently remains for many hours in the same place at the most favorable period for feeding; namely, in summer. It is aware of the pike's voracity, and remains always cautiously at a distance from it. The introduction of the pike is practised for two reasons: (1) That the carp may not constantly remain in the same feeding-place, but, frightened away by the pike, may visit others also; (2) it is done, and principally so, to prevent the more mature carp from spawning. Should the spawning occur, as is the case occasionally, the young fry will be devoured by the pikes, which otherwise would have deprived the large carps of their food. The pike will also destroy those fishes and their spawn which had succeeded in getting into the ponds without the knowledge or through the inability of the culturist to prevent it. Great care is required in the introduction of the pike; specimens of minor sizes than that of the carp must be selected. The growth of the pike being much more rapid than that of the carp (three hundred per cent per annum), the former should be younger by one year at least than the latter, so that it may not prove dangerous to the carp. If this precaution is taken in the introduction of the pike, it will be an actual boon to the carp-colonies; for it will not only exterminate by degrees all those parasitical fishes which intrude themselves into the ponds, but it will devour frogs, or the smaller kinds of its own species, as well as water-snakes and tritons.

Should the pike suffer from want of food, after having cleared the pond of all these animals, it must be supplied with it. Small spoiled fishes, or such as have been stunted in their growth, will answer the purpose. If this is neglected, the hungry pike will attack its companions, the carps; and, though it may not devour them, it will mortally wound them with its teeth.

I have so far given the principal traits of natural carp-culture, and will speak more explicitly of the artificial impregnation and hatching of the carp's eggs in my next report. So far as I know, this latter method has been little, if at all, employed in Europe, although it offers much greater advantages for the production of vast quantities of spawn. My own experiments were rewarded by the best results. I intend continuing them this summer in Baltimore, and hope to communicate the results hereafter.

I now proceed to give a few rules of general importance for the construction and management of carp-ponds.

The ponds should have as shallow a border as possible. Their depth should be in accordance with their size, — one foot in the culture or regular carp ponds where large fishes are kept; one-half foot in breeding, and one-fourth to one-half foot in hatching, ponds. The borders should be of considerable width. It is desirable in any case that a great number of such shallows be contrived in ponds, as these are the principal feeding-places of the carp.

Another important condition to be considered is this, that the water in ponds must be of the same depth all the year round, any variation in this having an injurious influence upon the fishes.

Ponds of smaller circumference, of from ten to fifteen acres, are, according to results obtained, better suited for carp-culture than very large ones, a hundred to a thousand acres in extent. These are frequently found in Central Europe upon tracts of land belonging to some princely domain. In the former the fish finds more security, the bottom of the pond being smoother: it also suffers less from the waves, these, being high and rough in large ponds, becoming very detrimental to the spawn and breeding-fishes, especially during storms, when they are cast ashore, and become the prey of water-fowls or perish in some other manner.

The diminution of water by evaporation must be made up for by a fresh supply: this, however, must not exceed the quantity actually needed for maintenance of the regular height of water. Small ponds of from one to fifty acres' area, which serve some commercial or industrial purpose, as mills, &c., and which are constantly varying the height of their water, cannot be considered as favorable for regular culture-ponds. Although the fishes may grow to a pretty good size in them, they must still be regarded as belonging to the category of waters for "free fishing," like lakes and rivers. In these neither the height of water, nor the hatching of the eggs, nor yet the increase of aquatic animals, can be regulated at will. Still, leaving these waters to lie waste on this account would be a pity; for, if stocked with carp, they will, in spite of all disadvantages, remunerate the proprietor, and the care which he bestows on them will be a source of much pleasure.

I beg to make some remarks, in conclusion, relative to the introduction of the carp, and its increase in open waters, in which it is solely left to the care of nature, and to which subject I alluded at the commencement.

We introduce into our waters migrating fishes, such as the salmon and shad, and find it profitable, for the reason that they consume but little food in the rivers, growing up in the sea and ascending into fresh water as large fishes. We also maintain in our lakes white-fish, bass, pike, &c. These are all fond of animal food and belong in part to the class of fishes of prey. The carp, on the contrary, lives upon vegetable food, insects, larvæ, and worms; but it never attacks other fishes or their spawn. It can be produced in masses, and then be transferred into the waters destined for its reception. This can be done either by artificial impregnation and hatching, or in the way of natural increase.

For each of these methods two ways of action are open: (1) the spawn can be transferred into open water as soon as it is free from the egg; or (2) the young fishes may be kept in ponds for a season until they have had time to grow, — that is, for one summer. In the latter case, the rule, that fishes which are destined for open waters must not be artificially fed, is to be strictly adhered to. Carp which have been used to feeding in that manner will not be so apt to find the food for themselves which until then had been supplied to them. Tormented by hunger, they will lose the fear of their enemies, and the consequent cautiousness, falling an easy prey to them before many weeks will have elapsed.

If artificial feeding is not intended, the ponds for the reception of the small fishes must be proportionately larger, so that they may find food in sufficient quantities in a natural way. Both methods have their advantages. If the young fry is transferred into open water five or six days after hatching, there will be no necessity for the establishing of large ponds. A great number of eggs must, however, be hatched in this case; for the small fishes will be destroyed in vast numbers by their enemies.

The better method of the two is certainly this: to keep the young fishes in large ponds until the fall, when they will have reached the age of five or six months. During this time they will have had the opportunity to learn how to find their food by their own efforts, such ponds producing it profusely to satisfy all their wants, and thus they will be prepared for their stay in open waters. To carry through the latter method, a larger extent of water is required, nature itself having indicated precisely the conditions under which and the limits in which the natural and unimpaired growth of the young fishes may be expected.

They do not require as extensive a pond during the first months of their development and growth as those which have reached a more advanced age. For this reason it will be more advantageous to choose the middle way by retaining the young fishes in the ponds for about one or two months, and then to give them their liberty, instead of transferring them immediately after the hatching or keeping them for five or six months. By acting upon this suggestion, the incalculable advantage will be gained that the fishes profit by the rich food of the open waters during the season, and will have grown strong enough to fight more successfully for their existence. For this purpose establishments for artificial breeding, constructed with a regard to the demands of climate, are essentially needful in these open waters, so that the greatest possible number of eggs may be hatched.

In Europe the subject of stocking open waters with carp has been discussed, because there, in its native country, its excellent adaptation for this purpose has been recognized.

I observed above that this fish is found in great numbers in most of the European rivers, particularly in the Rhine. Although this river has a very swift current, which at times forms rapids, here neither mud nor suitable ground is to be found which would qualify these localities for feeding-places for the rather indolent carp. Still, there are numbers of shallows and small creeks, the borders of which are richly overgrown with grass and *Festuca fluitans*, where the fishes find food plentiful and multiply.

The river carp is not as fleshy as the pond carp: this is accounted for by the great amount of bodily exercise which it is naturally compelled to take. In many places it is more highly appreciated than the pond carp, probably because the river-water does not impart to it the mouldy taste which is sometimes found with the carp inhabiting ponds situated in marshy localities and morasses which have not a sufficient supply of fresh water.

The assertion in regard to the preference given to the river carp will be found to be correct, especially in regard to the Rivers Rhine, Elbe,

Weser, Vistula, Loire, Rhone, Garonne, and the Danube. The latter is celebrated in song as the beautiful, blue Danube: in reality its water has, during the greater part of the year, a grayish-white, muddy color, and a very swift current. It has, however, particularly in Austria, Hungary, and the lowlands in general which border upon it, numerous branches which creep along sluggishly, and also many small creeks with almost stagnant water.

A great number of fishes of prey inhabit this river, — the pike, perch, the rapacious hucho (*Salmo hucho*), and, above all, the never-satisfied wels (*Silurus glanis*), which, in the lower Danube, reaches a weight of five hundred pounds. Its habits being similar to those of the carp, it lies on the mud banks or feeding-places of this fish, and becomes its most dangerous enemy and insatiable destroyer, and still the carp increases in the Danube. From the city of Ulm, where this river begins to be navigable after its escape from the Black Forest, a thousand miles downward to its mouth on the Black Sea, as also in this one, the carp is found. To this fact allusion has been made on a former occasion. The carp thrives best in those parts of the Danube where the water is least clear, — at the influx of the muddy water of its tributaries. At one time I was present at a draught of a seine, which took place close to the quay of the city of Pesth, in Hungary, and was arranged by Mr. Szihelsky Ferentz. At that point the river is constantly ploughed by steamers, steam-tugs, canal and ferry boats, and it would have seemed that there could not be many fishes there; yet three hundred fine carp, weighing from one to five pounds each, were taken in one draught of the net, within the distance of about one-quarter of an English mile. The carp is partial to this locality, because it finds abundant food there in the offal from kitchens, slaughter-houses, breweries, and the sewers of both the cities of Ofen and Pesth. In the European lakes — for instance, in the lakes of Constance, Zurich, and Geneva — the carp comes sometimes from these into the ports to seek for food.

Comparing the water of the Danube with that of the Mississippi, I feel convinced that I may safely assert that the carp would thrive excellently in the latter, although its water appears to be even more muddy and rapid than that of the Danube; and I believe this to be true of the Missouri and Ohio and many others of its tributaries. The Mississippi has near its borders many spots where the current is slow, and which are partially covered with vegetation. There are also numerous creeks, where the fishes would find food plentifully in the alluvial mud on the banks. What has been said of the Mississippi will be found to be the case with many other, or probably nearly all, American rivers. They will be found to be adapted for the introduction of the carp, so long as they are not mountain torrents which have to break their way through rocky and pebbly ground. The increase of this fish is of great importance from an economical point of view, especially so in regard to the south-western waters.

Under the present circumstances it is to be hoped that the endeavors which have been made for this purpose may before long be rewarded by success, and become a *fait accompli*, and that the difficulties which will have to be overcome may not prevent the achievement of it. The effort will and must meet with success at last.

5. — *Taking the Fish from the Ponds.*

The emptying-out of ponds demands the greatest caution and attention. The water must be made to flow off very gradually through the several outlets, all of which are to be kept open at the same time. It requires frequently from ten to eighteen days to draw off the water. The fishes are driven carefully and slowly with boats into the principal ditches. They must not be chased on any account, or they will bury themselves in the mud. Occasionally many thousands will do so within a few moments, and will remain there, pressed together closely, and so perish through suffocation. This is recorded as having occurred from time to time, when, during the process of driving them into the ditches, the fishes were startled by some unknown cause, and all sank into the mud instantaneously. Through the impossibility of extricating them speedily enough, many hundreds and even thousands perished, the owner sustaining heavy losses in consequence. To guard against such an emergency, preparations should be made for an immediate supply of water in similar cases, in order to save the fishes. If the fishing-out progresses in the regular manner, the fishes will by degrees draw off from the ditches into the collector. The collecting takes from five to six days in large ponds, containing frequently one hundred to four hundred tons of fishes. Care should be taken, that crowding them together may be avoided. On the evening before the fishing-out, when the water of the pond has been diminished to the depth of half a foot, those fishes which have been collected are shut off from the pond by a large net; and in the early morning, at the dawn of day, they are caught. As so large a number of fishes cannot be disposed of at once, they are transferred to the so-called market-ponds, from which they are sold by degrees to fish-dealers. These market-ponds are quite small, capable of holding from two thousand to three thousand pounds of fish only, and are supplied with running water.

Those who never saw the fishing-out of a carp-pond can scarcely imagine the beautiful sight of so many thousand fine fishes, fat and well fed, raising their high, broad backs, and thick, puffy lips above the water; their heads side by side; all being nearly of the same size, weighing from four to five pounds; their bodies closely pressing against each other, looking like an immense herd of sheep imprisoned in one large net upon a circumference of three thousand to four thousand feet. Closer and closer the circle is drawn around them, until its extent measures only about two acres, when they are caught by thousands, weighed in lots of one hundred pounds, and then they are placed into the market-ponds. The pikes, which have reached an almost equal weight, are put into pike-ponds. It requires often two or three days to weigh the fishes, ponds of one thousand or two thousand acres' area containing on an average two hundred tons of carp and twenty tons of pike; tench and other fishes not included.

I assisted once at the fishing-out of one of these ponds, which took place in the neighborhood of the town of Guben-Pleitz, province of Brandenburg, Germany. The pond was the property of a competent culturist and valued friend, Mr. Thomas Berger of Georgenhof, near Cottbus-

Peitz. The ponds in which this gentleman carries on carp-culture exceed the extent of six thousand Prussian acres. The pond which was fished out at the time I speak of was but a small one, not more than two hundred acres in size ; yet, to my surprise, I found that the greater number of the fishes were fine specimens of about three pounds' weight, though they were but in their second year, having weighed no more than one and one-fourth pounds five short months before (the fishing-out took place at the beginning of October), and they had attained to this great weight in a comparatively very limited space of time. Several establishments of this kind are located in that district, and they commonly belong to some large princely domain (crown property). They are, like all large fisheries, admirably managed, and the results are most satisfactory.

6. — *Mixed Carp-Culture.*

We have so far spoken of carp-culture, according to the different age of these fish, in special ponds (hatching, breeding, and carp ponds), termed "class-culture" in Central Europe. We must now speak of another method pursued in so-called "mixed ponds," in which there are fish of all ages, from one year to eight to ten years.

Not much can be said regarding this method, as there are no hatching and breeding ponds, but only one pond, which, however, must combine all the characteristics of the class-ponds. It must therefore have shallow places, overgrown with grass or aquatic plants (*Festuca fluitans* and *Phelandrium*), for the spawners and the young fish, and also places, eight to ten feet deep, for the larger fish. If such a pond is to yield some profit, it must also be particularly rich in food. A natural pond may be used, or, if such a one is not found, it may be artificially constructed. It is indispensable, however, that such a pond should have the same depth of water all the year round ; and it should be so arranged that even the last drop of water can be let off, as occasionally even the smallest fish, measuring only two to three inches in length, must be taken out. Such "mixed ponds" must likewise have "collectors" and "collector-ditches." It will also be found very useful to construct a sort of hatching-place on some flat and sunny place near the bank : i.e., a so-called cut in the bank, measuring forty to one hundred feet in length and thirty to fifty feet in breadth, and having a depth of five inches to one and one-half feet. This cut should be thickly planted with the above-mentioned aquatic plants, and ought, so to speak, to be the only place in the pond where carp can ascend from the depth in order to deposit their eggs conveniently and engage in the spawning process.

As soon as this has taken place, the entrance to this cut is closed with a net, so the eggs cannot be eaten by the fish. This net may be removed when the young fish have come out of the eggs ; but it is preferable to leave it in its place for some days, that the young fish may be able to feed for some time undisturbedly.

In Europe this method was generally adopted by beginners in carp-culture, commencing with a "mixed pond," and gradually proceeding to the small "hatching-pond," and finally to the "breeding-pond," as the great advantage of separate ponds for the different ages of fish over the "mixed-pond" system soon became evident.

In such a "mixed pond" no pike must be kept for regulating the stock, as may be done in a class-pond; for all the small fish would then soon be devoured. It must be made a strict rule, that, with the exception of the tench (*Cyprinus tinca*), no other kind of fish, however harmless, is allowed in the pond. The tench is related to the carp: but it spawns four to five weeks later; so there can be no danger of cross-breeds.

Great care should be taken that no gold-fish (*Cyprinus carpio auratus*) or bream (*Brama*) get in the pond; for these fish would soon mix with the carp, and tend to degenerate the breed. Such fish should therefore be removed or killed at once. The gold-fish, especially the milter, swims in spawning-schools like the carp, and at the very same season. It thus spoils the eggs of the carp, as all eggs which it impregnates will produce spotted fish, having at least a silvery streak, one-fourth to one-half inch long and one-eighth inch broad, between the caudal and the dorsal fin. Such bastards (the cross-breeds of gold-fish and *Carassius* also resemble them) do not grow larger than gold-fish, and have as many bones. They are unfit for table use, and entirely unsuited for ornament, as they are neither genuine carp nor gold-fish, and are disagreeable objects in the eyes of the scientist or connoisseur. If such fish are not removed immediately, the consequence will be another cross-breed during the next spawning season, — for such a hybrid spawns, like the gold-fish, when it is a year old, — and the breed of carps would degenerate still more. It is best to kill such worthless cross-breeds at once, as they are apt to give great trouble.

I would embrace this opportunity to impress, upon every carp-culturist who intends to make breeding experiments with any carp procured through the United States Fish Commission, the importance of having if possible only *one* of three above-mentioned kinds of carp, unless he can have every kind in a separate pond. Thus, the common carp (*Cyprinus carpio communis*) should never be placed in the same pond with the "mirror carp" or the "leather or naked carp" (*Cyprinus carpio alepidotus, coriaceus vel nudus*), nor should the two last-mentioned varieties ever be in the same pond. Cross-breeds would invariably be produced, and in such a manner that one would have neither genuine common carps nor genuine mirror or leather carps, but a cross-breed of all the three varieties. Not even when quite young and not yet capable of spawning should these varieties be put together, because, even if they are kept strictly separate during the spawning process, the young fish would never have the sharply marked characteristics of their variety as regards form and color, but would approach nearer to the "mirror carp" and the "common carp." The carp has a striking tendency, when living with other varieties, to approach the primitive form of the common carp, and finally to be merged in it. These beautiful varieties should therefore be kept strictly separate. Lack of ponds or any other reason should never induce people to mix them.

If the breeding experiments are to be accompanied by good results, a pure variety should be selected, and the finest and best milters and spawners, showing strongly all the characteristics of their variety, should be procured; and the experiments will be crowned with success.

I must return to the so-called "mixed culture," by mentioning that it is not to be recommended. In Central Europe it is never practised by scientific pisciculturists, but only by small operators mostly in so-called "peasants' ponds." This method does never yield a certain and truly profitable result.

7. — *Feeding the Carp.*

In conclusion, I will make some remarks on the feeding of carp in close ponds. It is not every natural pond which is a good pond, having the essentials of a good soil at the bottom, and capable of producing sufficient food for the fish. If these conditions are wanting, the fish must be fed. This is, as a general rule, only necessary in ponds with sandy bottom without any clay. As I have said before, I am *not* in favor of feeding fish, as my stand-point is that of the rational culturist, sharing the opinion with most of the prominent pisciculturists of the Old World, that the carp should find its own food in the ponds.

If, however, the nature of the bottom demands artificial feeding, or if suitable food can be had at a remarkably cheap price, the feeding should be done with great caution. Never feed in one and the same place. Even if the pond be very large, distribute the food in different places near the banks. If the food is always put in one place, or even if it is distributed over two places, the carp will stay in the neighborhood of these places, will become languid, and, instead of scouring the other parts of the pond in search of food, will remain at the bottom. It will even, if surrounded by the richest food, grow fat, but never have any firm flesh; nor will it ever grow much in length, as the somewhat phlegmatic fish does not get the exercise which favors its growth.

Never give them much food at one time, but by degrees, in small quantities, — never during the day, but either early in the morning or in the evening. During the hot season only feed them late at night, because the carp, if it has eaten sufficiently in the morning, will remain at the bottom all day; while, during the higher temperature of the water, it is necessary for its health that it should swim round, and get a change of water. It is therefore useful to place in ponds containing large carps a limited number of pike, which, however, must be smaller than the carp. The carp fears the pike, and flies from it. If there are pike in the pond, the carp will get more exercise, and will seek natural feeding-places, whither, on account of its innate sluggishness, it would never have gone.

Pond carp are accustomed to other food than the river carp. The former confine themselves to worms, larvæ, and plants; while those living in streams find all sorts of animal and vegetable refuse. These latter can also stand a greater amount of food, as the current naturally makes them take more exercise, thus increasing their appetite. It is different with the pond carp: if you give it too much food, it will not take any more than is necessary to satisfy its hunger. The remnants will remain at the bottom, and, if their quantity be considerable, they will spoil the water. If these remnants are chiefly animal refuse, as flesh or blood, fungi will grow on them, and will then produce, as with the salmon and trout, diseases of the skin, the gills, and, in the case of the carp, sometimes internal diseases.

The writer once had the following experience: During his absence a number of large carp were fed on coagulated blood, which had begun to putrefy. The fish devoured it eagerly, got sick, and most of them died in a few days from an inflammation of the intestines. Spoilt food should never be given to fish. If slaughter-house or kitchen refuse can be had, give these, chopped up small about the size of peas. Never give so much that remnants remain for any length of time in the water and begin to putrefy. Let no one be induced, by the circumstance that the carps like to eat the dung of hogs, sheep, and cows, to feed them on any putrefying matter. There are instances on record that thereby epidemics, particularly diseases of the scales, have originated.

The carp likes, above every thing else, vegetable matter, such as cabbage, lettuce, boiled potatoes, corn, turnips, pumpkins, melons, &c. The refuse of malt from breweries and distilleries is also very good food for carp; and, wherever such refuse can be had, it should be given to the fish.

The small pisciculturist, having a pond of perhaps one to two acres near his house, will often be able to feed his fish on refuse, as he will always have it fresh from the kitchen and stable.

In conclusion, I earnestly recommend the culture of the carp to all pisciculturists. If the value of the carp for table use has once been recognized, it will become a highly esteemed fish, especially in the neighborhood of large and populous cities, and its culture will yield a larger and more certain profit than the expensive trout.

8. — *Extent of Carp-Culture in Europe.*

In Europe many thousand acres of artificial waters are to be found. In these enormous quantities of carp are bred. Some of these ponds, or rather lakes, have an extent of about one thousand to two thousand acres. They are provided with gigantic dams, many of them sixty feet high. By these the water is closed in into broad valleys, containing no other fishes than carps from four to five pounds in weight. If we consider the size of these lake-like ponds, surrounded by enormous dams which are overgrown with oak-trees one hundred to three hundred years old, series of three and more of these lakes being not uncommon, then we can form some idea as to the remunerativeness of these establishments, particularly in Bohemia.

The standard establishment with regard to the most extensive business transactions is found in Austria. The Prince of Schwarzenberg, of whom I have spoken previously, possesses more than two hundred and fifty ponds of large size; the smallest having about ten acres', the largest two thousand acres' water extent.

We find many villages where ponds of fifty to two hundred and more acres are maintained at the expense of the community.

[E.]

RETURNS OF WEIRS, SEINES, AND GILL-NETS.

The number of these from which returns have been received since the passage of Act (chap. 104, 1876) is as follows: —

| | 1880. | 1879. | 1878. | 1877. | 1876. |
|----------------------------------|-------|-------|-------|-------|-------|
| Sea-seines | 26 | 34 | 34 | 35 | — |
| Weirs | 66 | 53 | 52 | 56 | 17 |
| Gill-nets | 71 | 100 | 97 | 120 | 24 |
| Sundry fresh-water fisheries . . | 48 | 46 | 55 | 42 | 16 |

During the past season, as compared with that of 1879, the weirs have taken *less* shad, alewives, mackerel, scup, and blue-fish; and *more* herring (large increase), striped bass, squeteague, Spanish mackerel, flat-fish, and menhaden (very large increase). The seines, *less* herring, scup (very great decrease), squeteague, mackerel, tautog, blue-fish, frost-fish (strong decrease), perch, and smelts; and *more* shad (very great increase), striped bass (double), alewives (fourfold), flat-fish (threefold), menhaden (very great increase), and eels. The gill-nets, *less* alewives (hardly any), striped bass (very few), squeteague, blue-fish, tautog, flat-fish (strong decrease), menhaden (hardly any), and eels (few); and *more* shad (twenty-fold), herring, scup (the last two fourfold), and mackerel (threefold). The fisheries of the Taunton River and those of the little streams show a large increase of shad and alewives; while the shad-fisheries of the Merrimack and Connecticut continue to languish and dwindle. These fine streams together produced only two and a half times as many shad as the little Taunton.

TABLE NO. I. — POUNDS AND WEIRS. — Showing the Catch of each during 1880.

| TOWN OR PLACE. | PROPRIETOR. | Shad. | Sea Herring. | Striped Bass. | Alwives. | Squeteague. | Mackerel. | Spanish Mackerel. | Tautog. | Flounders and Flat-Fish. | Scup. | Menhaden. | Blue-Fish. | Eels. |
|----------------|---------------------------|-------|--------------|---------------|----------|-------------|-----------|-------------------|---------|--------------------------|-------|-----------|--------------------|-------|
| Centreville | T. F. Phinney & Co.. | 42 | - | - | 1,508 | 42 | 6 | - | 20 | 232 | 637 | 579,915 | 559 | 15 |
| Brewster | Freeman Atwood | 8 | - | 78 | 1,188 | - | 396 | - | 44 | - | 7 | - | 1,923 | - |
| " | T. Ellis | 372 | - | 243 | 1,489 | - | 1,036 | - | 418 | 44 | - | - | 9,576 | - |
| " | Ellis & Cahoon | 101 | - | 379 | 2,633 | - | 398 | - | 506 | - | 6 | - | 10,383 | - |
| " | V. B. Newcomb. | 91 | - | - | 1,870 | - | 105,174 | - | 23 | - | - | 6,592 | 1,013 | - |
| " | Parker & Ellis | - | 1,167 | 209 | - | - | 6,012 | - | 5 | - | - | - | 1,789 | - |
| " | J. R. Wixon | 15 | - | 2 | 1,810 | 1 | 56,207 | - | 146 | - | - | - | 57 | - |
| East Brewster | Rogers & Eldredge | - | - | 47 | - | - | 4,156 | - | 70 | - | - | - | 3,430 | 248 |
| Orleans | Isaac Hopkins | - | - | - | - | - | 680 | - | - | - | - | - | 11,812 | - |
| " | George S. Nickerson. | 1 | - | 21 | 245 | - | 4,635 | - | - | 10 | 1 | 300 | 14,875 | - |
| " | A. L. Walker | 1 | 11 | 22 | 470 | - | 445 | 1 | 85 | 35 | - | - | 33,299 | - |
| Eastham | I. H. Horton | - | - | - | - | - | - | - | - | - | - | - | 1,960 | - |
| " | E. F. Knowles | - | - | - | - | - | - | - | - | - | - | - | 7,799 | - |
| " | N. M. Knowles | - | - | - | - | - | 400 | - | - | - | - | - | 12,866 | - |
| " | W. H. Nickerson | - | - | 145 | - | - | - | - | - | - | - | 1,800 | 9,218 | - |
| " | James Savage | - | - | - | - | - | 57,840 | - | - | - | - | - | 8,537 | - |
| North Eastham | Philip Smith | - | 620 | 116 | 477 | - | 820 | - | - | - | - | - | { 16,380 54,291 | - |
| Truro | Charles H. Collins | - | 838 | - | - | - | 2,747 | - | - | - | - | 23 | 610 | - |
| Chatham | S. F. Bearse | 651 | 3,485,000 | - | 8,597 | - | 96,635 | - | - | - | - | 16,556 | - | - |
| " | P. F. Lauphear | 319 | - | 1 | - | 11 | 17,901 | - | 2 | - | 2 | 29,200 | 251 | - |
| " | Reed, Loveland, & Co. | 1,610 | - | - | 15,250 | - | 55,292 | - | - | - | - | 51,100 | 2 | - |
| " | George W. Reynolds. | 568 | 153,880 | 2 | 30,745 | 29 | 31,668 | - | - | 11,581 | 129 | 37,800 | 140 | - |
| " | Village Weir Co. | 1,032 | 54,450 | 1 | 4,974 | 8 | 71,410 | - | - | - | - | 10,313 | 445 | - |
| Harwich | J. W. Eldredge | 57 | - | 5 | 3,039 | 57 | 1,178 | - | 32 | 260 | 3,081 | - | 2,892 | - |
| " | Thomas Ellis | - | - | - | 163,766 | - | - | - | - | - | - | - | - | - |
| " | Harwichport Fish-Weir Co. | 343 | 22,715 | 2 | 7,575 | 10 | 1,443 | - | 47 | 318 | 835 | 34,650 | 84 | - |
| " | D. F. Weeks * | 191 | 4,275 | 151 | 5,257 | 154 | 16 | - | 10 | 1,750 | 279 | 150,844 | 1,092 | - |
| Dennis | Z. H. Baker | 1 | - | - | - | 52 | 5 | - | 13 | 87 | 108 | 43,550 | 757 | - |
| " | A. T. Chase. | 24 | - | 41 | 9,100 | 105,297 | - | - | - | - | - | - | 832 | - |

TABLE NO. II. — SALT-WATER SEINES. — Showing the Catch of each for 1880.

| TOWN OR PLACE. | PROPRIETOR. | Shad. | Sea Herring. | Striped Bass. | Alewives. | Scup. | Squeteague. | Mackerel. | Tautog. | Flounders and Flat-Fish. | Blue-Fish. | Menhaden. | Eels. | Frost-Fish. | Perch. | Smelts. |
|------------------|-----------------|-------|--------------|---------------|-----------|-------|-------------|-----------|---------|--------------------------|------------|-----------|-------|-------------|--------|---------|
| South Yarmouth . | H. E. Baker | . | . | . | 13,400 | . | . | . | . | . | . | . | . | . | . | . |
| Yarmouth . | Nathan W. Grush | . | . | . | 764,820 | . | . | . | . | 587 | . | . | 221 | . | . | . |
| Truro . | S. S. Lewis . | . | . | 11 | . | . | . | . | 77 | . | 332 | . | . | . | . | . |
| Wellfleet . | C. Z. Rogers | . | 13 | . | . | 116 | . | 1,137 | . | . | 353 | . | . | . | . | . |
| Hyannisport . | B. F. Lambert | 1 | . | . | . | 96 | . | . | 1 | . | 3,534 | 1,050 | . | . | . | . |
| " | H. C. Lambert | . | . | . | . | . | . | . | . | . | 5,160 | 500 | . | . | . | . |
| Cohasset . | David Rogers | . | . | 595 | . | . | 1 | . | 150 | . | 2,210 | . | . | . | . | . |
| Eastham . | R. Deane | . | . | . | . | . | . | . | 1 | 1 | 5,327 | 2,313 | . | . | . | . |
| " | H. L. Knowles | 1 | . | . | . | . | . | 510 | . | . | 5,290 | . | . | . | . | . |
| " | W. O. Knowles | . | . | . | . | . | . | 849 | . | . | 10,737 | . | . | . | . | . |
| Chatham . | L. Lombard | . | . | 100 | . | . | . | . | . | . | 6,330 | . | . | . | . | . |
| " | H. Howes | . | . | . | . | . | . | . | . | . | 400 | . | . | . | . | . |
| " | S. W. Gould | . | . | 1 | . | . | . | . | 1 | 21 | 1,909 | . | . | . | . | . |
| " | P. F. Tapplear | . | . | 1,368 | . | . | . | . | . | . | 2,535 | . | . | . | . | . |
| Westport . | Unknown | . | . | . | . | . | . | . | . | 3,000 | . | . | 7 | . | . | . |
| " | S. G. Allen | . | . | 2 | 2,299 | . | . | . | . | . | . | 15,889 | 7 | . | . | 992 |
| " | P. Kirby | . | . | 11 | 881 | 7 | 1 | . | 4 | 17 | . | 2,671 | 72 | 2,017 | . | . |
| " | J. R. Lawton | . | . | . | 226 | . | . | . | . | . | . | 100 | 2 | . | . | . |
| " | P. G. Potter | . | . | . | 1,638 | . | . | . | . | . | . | 10,859 | . | . | . | . |
| Tisbury . | A. Look | 5 | . | 1 | 115,000 | . | . | . | . | . | . | . | . | . | . | . |
| Edgartown . | J. H. Smith | . | . | 21 | 29,202 | . | . | . | 73 | . | . | . | . | 11,550 | . | 44,250 |
| Nantucket . | R. K. Dunham | . | . | . | . | . | . | . | . | . | . | . | 7,200 | . | 31,200 | 3,000 |
| " | D. Eldredge * | . | . | . | . | 58 | . | . | . | . | 964 | . | . | . | . | . |
| " | J. Hamlin | . | . | . | . | . | . | . | . | . | 2,765 | . | . | . | . | . |
| " | G. Phinney | . | 4,617 | . | . | . | . | . | . | . | 287 | . | . | . | . | . |
| Chilmark . | F. Hancock | . | . | . | 190 | . | . | . | . | . | 16 | . | . | . | . | . |
| Total . | . | 7 | 4,660 | 2,110 | 927,659 | 277 | 2 | 2,526 | 307 | 3,626 | 48,239 | 33,382 | 7,502 | 13,567 | 31,200 | 48,242 |

* Five Spanish mackerel.

TABLE No. III. — GILT-NETS. — Showing the Catch of each for 1880.

| TOWN OR PLACE. | PROPRIETOR. | Shad. | Sea Herring. | Striped Bass. | Alwives. | Scup. | Squeteague. | Mackerel. | Tautog. | Flounders and Flat-Fish. | Blue-Fish. | Menhaden. | Eels. | Perch. |
|----------------|-----------------|-------|--------------|---------------|----------|-------|-------------|-----------|---------|--------------------------|------------|-----------|-------|--------|
| West Yarmouth | B. Blachford | . | . | . | . | . | . | . | . | . | 200 | . | . | 250 |
| Cotuit | J. A. Fish | . | . | . | . | 512 | . | . | 390 | 1 | 20,826 | . | . | . |
| " | D. P. Nickerson | . | . | . | . | 12 | . | . | . | . | 1,698 | . | . | . |
| Orleans | J. Sparrow | . | . | . | . | . | . | 612 | . | . | 985 | . | . | . |
| South Orleans. | E. T. Young | . | . | . | . | . | . | . | . | . | 67 | . | . | . |
| Provincetown. | D. H. Atkins | . | 640 | . | . | . | . | 134 | . | . | 183 | . | . | . |
| " | Henry Atkins | . | 607 | . | . | . | . | 219 | . | . | 65 | . | . | . |
| " | J. F. Atkins | . | 2,380 | . | . | . | . | 5,098 | . | . | 2,398 | . | . | . |
| " | Joshua Atkins | . | . | . | . | . | . | . | . | . | 662 | . | . | . |
| " | D. W. Atwood | . | 8,811 | . | . | . | . | . | . | . | 5,608 | . | . | . |
| " | P. L. Bangs | . | 27,330 | . | . | . | . | 8,850 | . | . | 1,985 | . | . | . |
| " | F. M. Bowley | . | . | . | . | . | . | 9,581 | . | . | 79 | . | . | . |
| " | N. N. Cook | . | . | . | . | . | . | 480 | . | . | 2,509 | . | . | . |
| " | E. Doane | . | 10,840 | . | . | . | . | 5,534 | . | . | 681 | . | . | . |
| " | J. B. Dyer | . | 5,167 | . | . | . | . | . | . | . | . | . | . | . |
| " | H. Freeman | . | 1,400 | . | . | . | . | . | . | . | 1,004 | . | . | . |
| " | P. Freeman | 166 | . | . | . | . | . | . | . | . | 484 | . | . | . |
| " | John Genn | . | 3,376 | . | . | . | . | 411 | . | . | 449 | . | . | . |
| " | J. C. Harvender | . | 7,095 | . | . | . | . | 5,979 | . | 473 | 2 | 72 | . | . |
| " | L. B. Kelley | . | 6,879 | . | . | . | . | 3,259 | . | . | . | . | . | . |
| " | Benjamin Lewis | . | . | . | . | . | . | 5,238 | . | . | 941 | . | . | . |
| " | George Lewis | . | . | . | . | . | . | 3,759 | . | . | 764 | . | . | . |
| " | I. B. Lewis | . | 4,800 | . | . | . | . | 4,980 | . | . | 1,051 | . | . | . |
| " | Thomas Lewis | . | . | . | . | . | . | 13,029 | . | . | 255 | . | . | . |
| " | Joseph Mayo * | . | . | . | . | . | . | 30,497 | . | . | . | . | . | . |
| " | William Newcomb | . | . | . | . | . | . | 780 | . | . | . | . | . | . |
| " | T. K. Paine | . | . | . | . | . | . | . | . | . | 2,043 | . | . | . |

* Also 6 Spanish mackerel.

TABLE NO. III. — GILL-NETS. — Showing the Catch of each for 1880 — Concluded.

| TOWN OR PLACE. | PROPRIETOR. | Shad. | Sea Herring. | Striped Bass. | Alewives. | Scup. | Squeteague. | Macarel. | Tautog. | Flounders and Flat-Fish. | Blue-Fish. | Menhaden. | Eels. | Perch. |
|----------------|-------------------|-------|--------------|---------------|-----------|-------|-------------|----------|---------|--------------------------|------------|-----------|-------|--------|
| Provincetown | J. G. Rand . | - | 12,900 | - | - | - | - | 10,629 | - | - | 6,773 | - | - | - |
| " | Reuben Ryder | - | 34,045 | - | - | - | - | 8,528 | - | - | 2,041 | - | - | - |
| " | Joseph Sears | - | 43,632 | - | - | - | - | 4,617 | - | 105 | 1,358 | - | - | - |
| " | Isaac Small . | 2,839 | - | - | - | - | - | - | - | - | 1,052 | - | - | - |
| " | W. C. Snow | - | - | - | - | - | - | - | 80 | - | 160 | - | - | - |
| " | R. Swift | - | 2,200 | - | - | - | - | 1,118 | - | - | 1,234 | - | - | - |
| " | Isaac Tyler . | - | - | - | - | - | - | 3,389 | - | - | - | - | - | - |
| " | R. Wareham | - | 3,476 | - | - | - | - | 2,790 | - | - | 969 | - | - | - |
| " | J. C. Weeks. | - | - | - | - | - | - | 4,062 | - | - | 976 | - | - | - |
| " | J. E. Weeks | - | - | - | - | - | - | 5,603 | - | - | 1,769 | - | - | - |
| " | Benjamin Coan | - | - | - | - | - | - | - | - | - | - | - | - | - |
| Truro | C. N. Grozier | - | - | - | - | - | 395 | 1,286 | - | - | 263 | - | - | - |
| " | Isaac Smith . | - | - | - | - | - | - | 377 | - | - | 311 | - | - | - |
| " | J. F. Stevens | - | - | - | - | - | - | 729 | - | - | 374 | - | - | - |
| " | E. F. Worthen | - | - | - | - | - | - | 794 | - | - | 46 | - | - | - |
| North Truro | P. L. Paine . | - | 9 | - | 60 | - | - | 700 | - | 49 | 612 | - | - | - |
| " | L. & R. Small | - | - | - | - | - | - | 1,707 | - | - | 551 | - | - | - |
| Eastham | E. Dill . | - | - | - | - | - | 1 | 235 | - | - | 579 | - | - | - |
| " | J. Fulcher . | - | - | - | - | - | - | - | - | - | 2,250 | - | 434 | - |
| " | J. Penniman | - | - | - | - | - | - | 2,731 | - | - | 2,246 | - | - | - |
| " | C. H. Smith. | - | - | - | - | - | - | 1,095 | - | - | 7,427 | - | - | - |
| Chatham | Unknown | - | - | 8 | 326 | - | - | 1,432 | - | - | 2,850 | 470 | - | - |
| " | J. Gould & Co. | - | - | - | 239 | - | - | 1,482 | - | - | 4,951 | - | - | - |
| " | A. Mayo | - | - | - | - | - | - | 438 | - | - | 300 | - | - | - |
| " | William Patterson | - | - | - | - | - | - | 939 | - | - | 207 | - | - | - |
| " | J. F. Smith . | - | - | - | - | - | - | 752 | - | - | - | - | - | - |
| Dennis | F. S. Crowell | - | - | - | - | - | - | - | - | - | - | - | - | - |
| " | J. Pierce | - | - | - | - | - | - | - | - | - | - | - | - | - |
| West Dennis | Venez Kelley | - | - | - | - | - | - | - | - | - | - | - | - | - |
| Hyannis | David Bearse | - | - | - | - | - | 3 | - | - | - | - | - | - | - |

[illegible]

* Seven Spanish mackerel.

† One Spanish mackerel.

TABLE NO. IV. — CONNECTICUT RIVER SEINES.

| TOWN. | NAME. | Shad. | Pike. |
|----------------------|----------------------|-------|-------|
| Agawam | A. Converse | 1,324 | — |
| “ | A. J. Hills | 459 | — |
| South Hadley | C. C. Smith | 4,698 | 2 |
| Springfield | J. O. Leary | 107 | — |
| “ | R. H. Parker | 1,139 | — |
| Total | | 7,727 | 2 |

TABLE NO. V. — MERRIMACK RIVER SEINES.

| TOWN. | NAME. | Shad. | Alewives. | Salmon. | Striped Bass. |
|-----------------------|--------------------------|-------|-----------|---------|---------------|
| North Andover | Madison Kimball | 639 | — | 3 | 5 |
| Bradford | H. A. Nisbett | 16 | — | — | 3 |
| West Newbury | W. P. Goodwin | 6 | — | — | — |
| Newbury | A. E. Larkin | — | 1,800 | — | — |
| “ | A. C. Nelson | — | 21,950 | — | — |
| “ | Ira P. Newton | — | 8,650 | — | — |
| Amesbury | Jonathan Morrill | 1,478 | — | — | 2 |
| Total | | 2,139 | 32,400 | 3 | 10 |

TABLE NO. VI. — TAUNTON RIVER SEINES.

| TOWN. | NAME. | Shad. | Alewives. | Striped Bass. |
|-----------------------|-----------------------------|-------|-----------|---------------|
| Berkley | Nichols & Shove | 575 | 154,000 | — |
| “ | E. Hathaway | 550 | 150,000 | 30 |
| Dighton | I. N. Babbit | 674 | 94,716 | — |
| “ | Fred. P. Case | 350 | 120,000 | — |
| “ | N. Chase and others | 280 | 50,000 | — |
| “ | C. N. Simmons | 1,000 | 150,000 | — |
| Middleborough | George Brayton | — | 70,060 | — |
| Raynham | G. B. & E. Williams | 483 | 269,380 | — |
| “ | W. A. Robinson | 553 | 95,812 | — |
| Taunton | J. W. Hart | 356 | 111,900 | — |
| Somerset | George H. Simmons | — | 8,480 | — |
| Total | | 4,821 | 1,274,348 | 30 |

TABLE NO. VII — *Other Fresh-Water Seines, or Dip-Net Fisheries.*

| TOWN. | NAME. | Shad. | Alewives. | Frost-Fish. | Striped Bass. | Smelts. |
|---------------|-------------------------|-------|-----------|-------------|---------------|---------|
| Weymouth | Weymouth Iron Company, | - | 132,875 | - | - | - |
| Kingston | Cobb & Drew | 450 | 11,847 | - | - | - |
| Plymouth | William S. Hadaway | - | - | 10,000 | - | - |
| " | M. B. Marble | - | 12,219 | - | 1 | - |
| Sandwich | J. G. Battles | 2 | 271,200 | - | - | - |
| " | Town of Sandwich | 2 | 186,400 | - | - | - |
| Barnstable | Nine Mile Pond Fish Co. | - | 68,800 | - | - | - |
| Brewster | V. B. Newcomb | - | 54,866 | - | - | - |
| Wellfleet | George Baker | - | 42,516 | - | - | - |
| Harwich | T. Ellis | - | 180,058 | - | - | - |
| Dennis | W. Crowell | - | 4,300 | - | - | - |
| Yarmouth | D. L. Baker | - | 7,800 | - | - | - |
| Mashpee | M. Amos | 17 | 34,475 | - | - | - |
| " | W. R. Mingo | - | 8,800 | - | - | - |
| " | George T. Oakley | - | 2,050 | - | 1 | - |
| " | W. H. Simon | - | 2,780 | - | - | - |
| Falmouth | A. R. Baker | - | 7,400 | - | - | - |
| East Wareham, | George Sanford | - | 326,400 | - | - | - |
| Fall River | C. V. S. Remington | - | 12,000 | - | - | - |
| Marion | C. A. Hammond | - | 6,158 | - | 3 | - |
| " | A. F. Holmes | - | 476 | - | - | - |
| Mattapoisett | A. H. Shurtleff | - | 273,132 | - | - | - |
| Westport | S. J. Tripp | - | 14,799 | 106,330 | 924 | 4,606 |
| " | L. White | - | 2,908 | - | - | - |
| Chilmark | H. M. Smith, Estate of | - | 31,468 | - | - | - |
| Total | . | 471 | 1,695,847 | 116,330 | 929 | 4,606 |

TABLE NO. VIII. — *Seine-Fishery at Mouth of the Merrimack.*

| | Eels. | Menhaden. | Sea Herring. | Mackerel. | Blue-Fish. | Tautog. | Flounders. |
|----------------------|-------|-----------|--------------|-----------|------------|---------|------------|
| N. Lattime | 20 | 9,500 | 29,300 | 600 | 12 | 20 | 15 |



4 3 53

